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The Chemical Age

VOL LXIII 19 AUGUST 1950 No 1623

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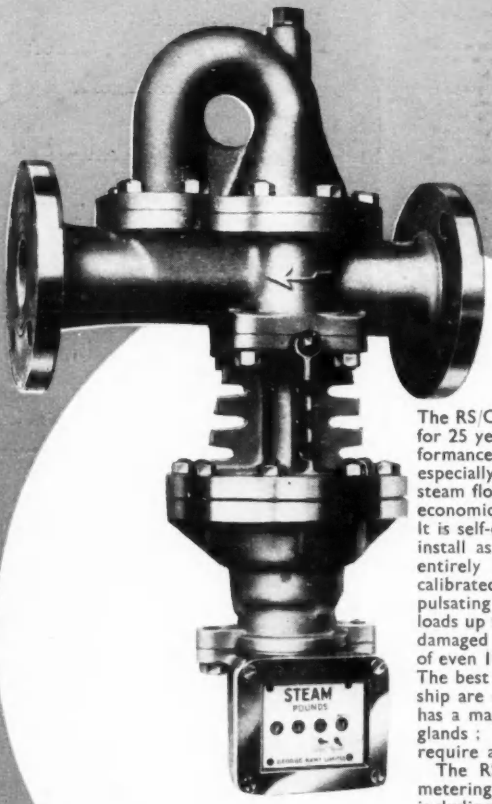

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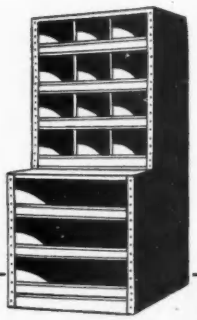

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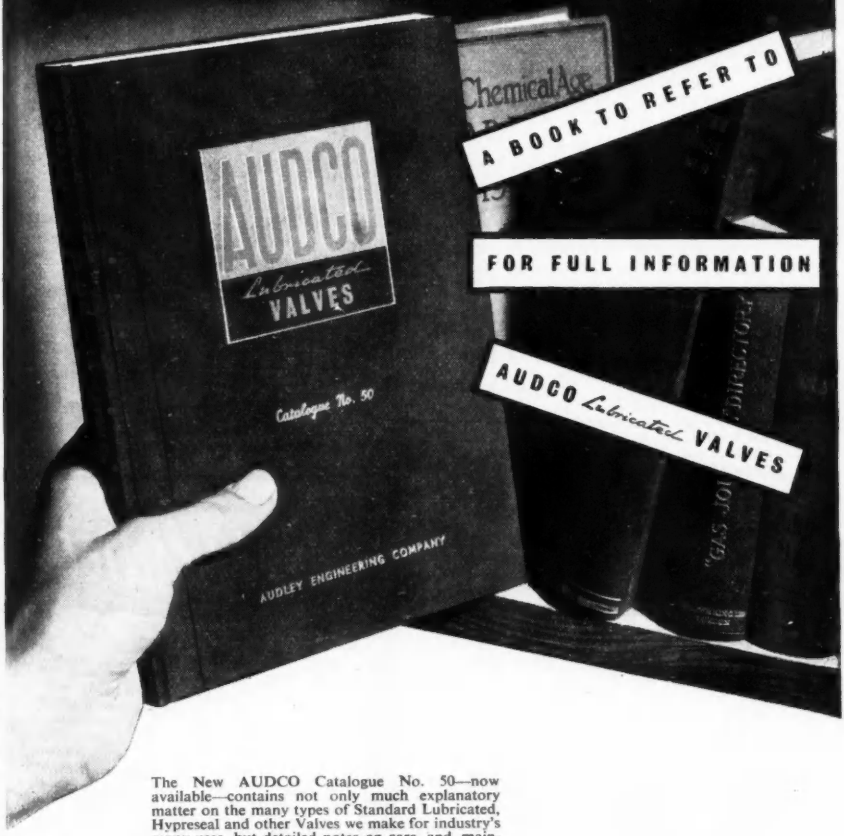

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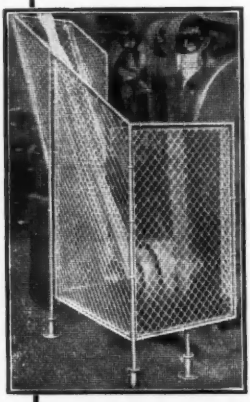

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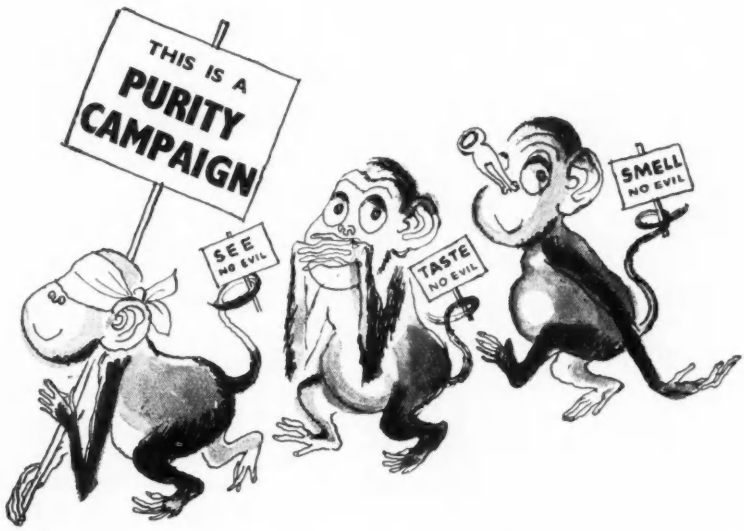

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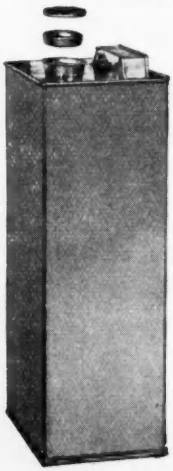

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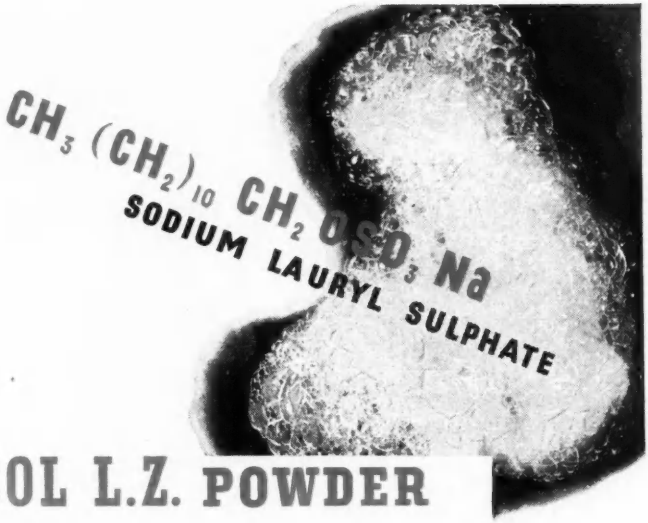

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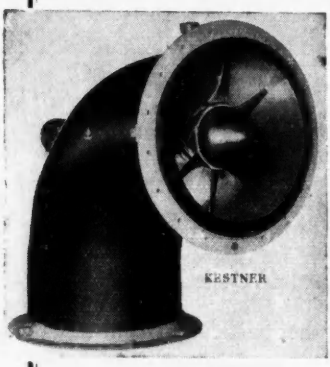

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Volume LXIII | 19 August 1950 | Number 1623

Protecting Chemical Industries

WITHIN the last few days a London firm of polish manufacturers whose interests run hand in hand with those of many chemical industries has brought off the equivalent of what in war would be the taking of a heavily defended position. It is reported to have induced one buyer at the Chicago fair to undertake to buy $1 million worth of its products within the next 12 months and another to contract to provide 100,000 Canadian dollars for supplies for the other half of the North American market. Transatlantic business on this scale overtops even the kind of achievement which the economic "trainers" of Sir Stafford Cripps's school have regarded as the appropriate target for British industries in America. Could it be secured by other producers, and especially by other industries on a reasonably widespread scale, the "dollar problem", which at the moment is withholding some most important supplies from the chemical industries and others, would soon be no more serious an impediment to trading with America than are the repercussions of the Boston Tea Party to-day.

That roseate prospect is marred, so far as chemical industries are concerned, by the rigid maintenance in the U.S.A. of a high and heavily buttressed tariff wall behind which their chemical industries have grown so abundantly that some of them have become a source of political embarrassment and the target for the sharp darts of the Anti-Trust Commission bandolieros. Whatever charges the attackers have been able to present against the great groups such as the Du Pont de Nemours complex of chemical and chemical and steel using industries none, however, has been able to belittle their most evident success or the impetus they have added to the forces that have raised American economy and living standards to almost dizzy heights.

The bastion which has so successfully held off the invaders is deeply rooted in American policy. The foundations of much of it were laid in the 1920's when the U.S.A., like the United Kingdom, was ruefully counting the cost of having entered a world war which was largely dominated by chemicals and steel with great gaps in her capacity to produce the former. The reaction in this country is commemorated to-day by what remains of the Key Industries Duties schedule, which, unlike the U.S. tariff wall, has never been sacro-

On Other Pages

The annual subscription to THE CHEMICAL AGE is 30s.; single copies, 9d.; post paid, 1s.; SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3970). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham Midland 0784-5). THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers, Limited.

sanct when reciprocal arrangements to widen the bases of world trade have been the objective.

Much more is going to be said about that desirable objective—of throwing open more markets—when 18 nations assemble their trade representatives at Torquay this autumn with the intention of negotiating freer trading arrangements by reciprocal adjustments of trade and tariff agreements. It will be very surprising if that conference does not produce some demands for a number of fresh entry ports through the relatively slender defences of British chemical industry. The U.S.A., notwithstanding its unique capacity to offer wanted chemical shipments, will not be the foremost in the list of applicants. American chemical manufacturers have no illusions about their capacity to compete on a price basis in the sort of materials which we can produce ourselves. Their own estimate of comparative wage rates in dollars against devalued pounds leaves little room for doubt on that point. The average wage of a Dow Chemical Company worker, it is said, is about 360 per cent of the wage paid in a British competing industry. British wages are higher than almost any others in Europe and a large influential section of American opinion, in which the powerful trades unions join hands for once with managements, has the firmest determination not to permit the starting of a price (and wage) cutting campaign.

Any who believe that the American attitude at the Torquay conference in respect of chemicals will be distinguished by the liberality which has characterised most of their President's foreign policy can have paid no regard to what American chemical opinion says about this. The Washington Government committee concerned with the Reciprocal Trade Act, which recently invited chemical manufacturers' views on the subject of tariff remission, was left in no doubt. Faced with suggested tariff reductions which would include some 200 chemicals of the type made by the Dow Company, the leaders (of Dow, U.S. Industrial Chemicals and the Monsanto Chemical Company among others) have presented a rebutting case which even President Truman's prerogative to cut U.S. tariffs by half probably dare not overrule. It foresees such things as American phenol manufacturers driven out of production, unemployment, the curtailment of research and develop-

(*continued on page* 248)

Notes and Comments

Industry and Rearmament

UNEASY recollections of industrial rearrangements of a decade ago, when chemical plants were among the first to subordinate their commercial programmes to supply the needs of national defence, have been revived this week by the knowledge that preliminary talks on industry's contribution to defence have been taking place between the Government and the chief employers' federations, such as the Federation of British Industries. Memories of shadow factories, the re-tooling of peaceful works for war equipment and the rest cannot be entirely banished in the light of the evident necessity for a measure of rearmament, the magnitude of which at present remains a secret of which presumably only the Cabinet and the Treasury know the answer.

Artificial Scarcities

THIS is clearly the moment when perhaps the most serious danger to the normal functioning of chemical industry and the multitude which depend upon it is not so much that a rearmament programme might make large abnormal demands as the temptation to over-purchase in some directions in fear of future shortages. In countries where famine is almost of routine recurrence it is well recognised that calamity is bred as much by the automatic hoarding by the few as by the actual shortfall in food supplies. It is to be hoped that no one now will discern an emergency where none exists. Should large-scale re-armament in fact prove necessary British industries would on this occasion not have to bear the burden without the formidable aid of American industries. And the eventuality, it is well to remember, is still only a hypothetical one.

PRO for U.S. Chemicals

CHEMICALS—in the widest connotation of the word—now represent one of the largest sectors of industry in the U.S.A. As awareness of that spreads those who direct the leading component groups are becoming increasingly conscious of the need to give a responsible account of what goes on to those outside. Even colossi, it seems, do not despise public relations officers. The most recent evidence of that is the decision of the U.S. Manufacturing Chemists' Association to entrust to an expert spokesman, Robert L. Taylor (editor of *Chemical Industries*), the rôle of interpreter of manufacturing achievements and objectives to the rest of America. That decision contrasts strangely with the extreme reticence which still distinguishes most branches of chemical industry in this country. The American reasons for wanting to state their case, as presented by the president of the Monsanto Chemical Company, Mr. William M. Rand, deserve a wider hearing than the MCA membership. "There has never been greater need for the chemical industry—as an industry—to tell its story to the public and to Government," says Mr. Rand. "Many in high places apparently do not understand what the chemical industry is, what its record has been, and what promise—under a free economy—it holds out to our nation. Our facts must be brought home forcefully and frequently to persons outside our industry—whether in Government or labour or any other activity."

Leadership in Atomic Research

AS a timely antidote to the propaganda which the "Kremlin countries" feverishly disseminate to identify the U.S.A. as the atomic warmonger the eighth semi-annual report of the American Atomic Energy Commission deserves wide distribution—much wider in fact than it seems likely to get. It recalls two highly relevant facts: the rapid multiplication in America of peaceful advances in the uses of atomic energy, and the absence of a report of any kind on the work which is known to be in progress in Russia. The American report, which reviews most of the significant facts

since the production of fissionable material on a large scale began, does not attempt to disguise that, in accordance with President Truman's directive, work has continued on all forms of weapons, including the hydrogen bomb. Of the need for that current events are unfortunately providing all the testimony needed. The important thing is that the West has never lost sight of the ultimate objective—the scientific control of nuclear energy for peaceful ends. Two experimental reactors of new design for research recently reached the construction stage; the production and distribution of radioisotopes and stable isotopes to improve health, food production and a multitude of industrial techniques continue to grow. (There was a 36 per cent increase in distribution on the preceding half-year). The opening in May of the Oak Ridge Institute of Nuclear Studies, for the treatment of malignant diseases—particularly cancer—with short-life radioisotopes, is further proof of good faith. In industry it is the same story. Little of technological use is being withheld by the AEC and to that a long appendix of new patents in the report and the finding of an investigating committee testify. Meanwhile the costs of basic research remain high in comparison with the immediate material benefits set against them; in the fiscal year 1950 research contracts in physical sciences supported directly by the AEC will have cost $10.1 million, and in biology and medicine $7.8 million.

A Costly Export

THE news that Dr. Hubert Martin, of the Long Ashton Research Station, has just sailed for Canada to take the lead in Canada's insecticide and fungicide research is good news for Canada. It is very far from being good news here. It appears to indicate that Britain has been unable to keep a scientist who has been for many years a pioneer of chemical crop protection and whose work and authority appear to have been recognised more fully in America than at home. In Canada he will be in charge of the Government's new research department for insecticides and fungicides, the first in the world of that specialised kind. The gratification that Canada, in starting such an enterprise, should have turned to Britain rather than to America for the man to establish it is rather inadequate consolation. At a farewell gathering at Long Ashton Research Station last week Dr. Martin said that he had tried in vain to persuade the authorities here that we need facilities for similar research in this country. The situation invites speculation about what would have been said had Hobbs, in the prime of his career, departed for Australia because he had come to the conclusion that conditions in this country were not conducive to good cricket. The analogy is not as remote as it may sound. This loss of an outstanding scientist must be sustained at a time when his subject is more important and more complex than ever before. Since the war, there has been a succession of white papers and reports stressing the urgent need to widen and encourage British research facilities. Dr. Martin's departure is a dismal comment upon all these good intentions and bold promises.

PROTECTING CHEMICAL INDUSTRIES

(*continued from page 246*)

ment and the crippling of American defences. The last is a trump card at the moment.

Is the Board of Trade, which has now to study the possibilities of further concessions in our own chemical market, aware of the uncompromising stand which the American industries are taking about their own participation in this policy? That is one of the questions to which, in present circumstances, few people here can provide an answer. Trade federations, said the Board this week, are given ample opportunity to present the view of British chemical manufacturers. And there is nothing to prevent an individual manufacturer independently presenting his case. But here, unlike the U.S.A., all this is very much *in camera*.

CHLOROMYCETIN IN U.K.

U.S. Company Coming to Hounslow

PLANT for the production of pharmaceuticals, particularly chloromycetin, is to be erected by Parke, Davis & Company, at Hounslow, Middlesex.

Under the contract made with the Economic Co-operation Administration, the American firm will be able to convert into dollars up to $735,000 of its possible sterling receipts from its new investment in this country. The sum guaranteed covers the original investment of $420,000, plus possible earnings up to $315,000. Assets to be invested include cash, machinery, and equipment.

Approval of the investment has been given by the U.K. Government and the ECA has authorised the guarantee of convertibility as one of the means of encouraging the flow of American capital to finance recovery projects in western Europe.

This scheme is the twelfth ECA guarantee covering the new investment of an American company in the United Kingdom.

Overseas Trade in July

THE provisional value of exports in the 26 working days of July was £182.0 million compared with £175.8 million in the 25 days of June. (The latter figure, on a 26-day basis, was £182.9 million, the highest on record.) Exports in the second quarter averaged £169.4 million.

The provisional value of imports in July, £225.3 million, was roughly the same as the high level reached in the second quarter (£225.2 million a month) and was £38.4 million more than in July last year.

With re-exports at £6.2 million, the excess of imports over exports and re-exports (valued f.o.b.) was £37.2 million, making the adverse balance so far this year £256.9 million, compared with £239.0 million in the corresponding period of last year.

Leather Chemists' Conference

THE annual conference of the Society of Leather Trades' Chemists is to be held in the large chemistry lecture theatre, Leeds University, on September 22 and 23. Professor E. K. Rideal is to deliver the fourth Procter Memorial Lecture—on "Membrane Permeability." The presidential address will be given by Mr. G. Jessup Cutbush. The annual dinner will be held on September 22.

BRITISH SILICONE PROJECT

Lesser Dependence on U.S. Sources

THE prospect of creating a new range of British chemical materials of exceptional interest for the home and export markets was indicated in the recent announcement that Albright & Wilson, Ltd., is to make silicone products.

As agent here for the Dow Corning Corporation of America, Albright & Wilson has been the supplier for four years of a gradually increasing range of silicone materials for industry, such as heat and water resisting compounds, greases, inert liquids and foam inhibitors, resins and varnishes and Silastic rubber, all characterised by their extremely high resistance to destructive conditions. It is believed that virtually all these would have formed much more widespread use in chemical and some other industries had not dollar shortage precluded their distribution on that scale.

The company has started to equip premises at the Oldbury factory to produce all the materials which have hitherto been imported and some others. In the latter category are some of the special compounds which are particularly useful in facilitating easy release of moulds.

Because the type of plant required to originate organic silicon materials is unlike almost all existing chemical plant, it is thought unlikely that the new department at Oldham will start production in less than two years.

Several other chemical companies are known to have been engaged for some time past on laboratory investigation of the possibilities for the commercial production of silicone substances. Albright & Wilson's is the first production plan to have been announced.

Explosives in Cargo Ships

THE carriage of explosives and conditions of stowing in cargo ships are the subject of a revised list of instructions issued by the Ministry of Transport.

The circular (No. 1817(T.152) Amendment No. 1), is for the information of ship surveyors, shipowners, shipmasters and shippers and is an interim measure pending the publication of the report of the departmental committee on the carriage of dangerous goods and explosives in ships.

The revised list, dated May 1950, has no relationship with the explosion in the British steamer *Enterprise* in the Red Sea on June 19 or with the explosion on a naval ammunition barge on July 14.

ARDIL PROGRESS

Dumfries Factory Nearly Completed

THE prospect that Ardil, the synthetic fibre suitable for clothing and other textiles, will be commercially available before long is brought nearer by the news that construction at the factory being raised for the purpose at the I.C.I., Ltd., Nobel Division at Dumfries, has reached the stage to permit the installation of spinning machinery.

The project is dealt with in the August *I.C.I. Magazine*. Mr. J. E. Braham, the engineering controller, announces that very satisfactory progress continues to be made with the erection of the buildings. Work on the site was begun in April, 1949, and today, little more than a year later, all buildings, except that in which the actual spinning operations will be performed, are nearly finished.

Attractive-looking Factory

Much thought has been given to the design of all the buildings from the point of view of functional requirements, working conditions and external appearance. The finished factory should prove a striking example of how industrial buildings can be made attractive. The use of buff-coloured bricks for the outside walls gives a very pleasing effect.

Buildings with multiple vaulted roofs are, with the exception of the use of brick for facing purposes, constructed of reinforced concrete. They are the first of their kind to be built in Scotland. A changeover was made to concrete after work on the site had actually started, as the steel-framed construction originally intended was being seriously delayed by late deliveries of fabricated steel. This change may have saved as much as six months.

Apart from delays in structural steelwork, there have naturally been other difficulties with which to contend, one of which may be of interest. During site-levelling operations a small area of ground with very poor load-bearing properties was detected, and as this area was the site of the heavy tower building it had to be made good by driving nearly 300 20-ft. long piles.

The stage has now been reached at which civil engineering and building work is giving place to the installation of plant. It is planned to have sufficient plant and equipment in position by February 1951 to start production with about one-quarter of factory capacity.

To achieve this will be no easy task; but as a result of early ordering of long-

(*continued at foot of next column*)

delivery items, their availability when required should be assured. In fact, very large quantities of electric motors, pumps, gearboxes, valves, and piping of various materials, including steel, copper, lead, polythene and many other items, are already at Dumfries, housed temporarily in the large store building lying behind the tower building.

This store has been constructed for the raw material derived from groundnuts from which the Ardil fibre will be produced, as well as for the only by-product of the process, a meal which will be sold as an animal foodstuff.

CONTRACT ACHIEVEMENTS

$1 M. Order from Chicago

A CONTRACT to supply $1 million worth of British made domestic polishes has been awarded to the Furmoto Chemical Company, Ltd., of London, by Modern Chemicals, of Chicago, Illinois. A report from New York states that a Toronto company has also contracted with the company for polishes to the value of $100,000. The signing of this large contract was one of the noteworthy features of the opening week at the first U.S. International Trade Fair, and recalls the considerable progress made by Furmoto in their 26 years' operations in this country. During this period 64 gold medals have been awarded to the company's products at exhibitions all over the world.

£2 M. for Coal Plant

THE chemical engineering firm of Simon-Carves, Ltd., Cheadle Heath, Stockport, has secured a £2 million contract for new coal preparation plant for a group of Turkish mines. The order was booked in competition with American, Belgian, French and German firms.

The work, which is expected to take about two years to complete, is to include two complete washeries, which will be among the largest of their kind in the world. These will be located at Zonguldak and Catalagzi on the southern shore of the Black Sea. One will have the capacity to treat 750 tons per hour run of mined coal and the other 500 tons per hour.

Competition for Engineering Works

Three American engineering firms, as well as British ones, have applied to the Board of Trade for permission to take over the engineering works at Clayton-le-Moors, near Accrington, which will be vacated by Courtaulds, Ltd., at the end of this year.

STEEL OUTPUT MAINTAINED

July Production a Record

THE largest output of steel ever recorded in the month of July was attained last month when production reached an annual rate of 14.366 million tons, despite the effect of the summer holidays. The previous highest July figure was 13.145 million tons in 1940.

Production in the first seven months of this year has been running at an annual rate of over 16.5 million tons, compared with 16.0 million tons last year and an actual total of 13.25 million tons in 1939. Post-war development plans are now more than half completed and it is anticipated that the industry will be able to produce at a rate of 17.25 million tons by 1953.

The industry, according to the Iron and Steel Federation, is in a strong position to meet the impact of a re-armament programme. Among new plants which recently came into operation was a new furnace at Consett with a potential of 225,000 tons of pig iron a year, and two new open hearth furnaces at Colvilles with an eventual capacity of 168,000 tons of ingots annually.

Good Stock Position

Stocks of steel are good, having been increased since 1948 by approximately 800,000 tons. These could be reduced without danger to meet any temporary shortages.

Scrap supplies are likely to represent a problem, as the large quantities which have been received from Germany are unlikely to be maintained at the same annual rate.

In May, the industry decided not to pass on to consumers the increase in costs (about 10s. a ton of finished steel) due to higher transport charges. The rise in price of raw materials, however, is causing some concern.

Details of July production figures issued by the Iron and Steel Federation were :—

STEEL INGOTS AND CASTINGS

Tons

	1949		1950	
	Weekly average	Annual rate	Weekly average	Annual rate
1st ¼-year	305,700	15,897,000	319,600	16,619,000
June ...	300,900	15,645,000	312,500	16,249,000
July ...	244,200	12,697,000	276,300	14,366,000

PIG-IRON

Tons

	1949		1950	
	Weekly average	Annual rate	Weekly average	Annual rate
1st ¼-year	181,600	9,442,000	184,000	9,611,000
June ...	185,800	9,664,000	182,200	9,474,000
July ...	177,400	9,224,000	175,000	9,990,000

COAL PRODUCTION DRIVE

An Earlier Autumn Start

THE resources which it is now necessary to devote to defence, added to the usual winter-seasonal needs and the demands created by continuing economic difficulties, have necessitated an earlier start of Britain's autumn coal production drive—by mid-September at the latest, a month earlier than last year. This was announced by Lord Hyndley, chairman of the National Coal Board, in a letter to the chairmen of the divisional boards.

"The industry of the country," said Lord Hyndley, "is running at a pressure never before experienced and the demand for coal from factories, power stations, gas works and the railways, combined with that from the domestic consumer, is rising steadily. It is now every week nearly equal to what we are producing. There is little left over to meet overseas demand and to stock up for the winter."

Individual Effort

Lord Hyndley said the coal industry's National Consultative Council, at whose instance he was writing, had unanimously decided that a production drive should again be undertaken, and he asked that divisional consultative councils should work out means of getting the intensified effort as quickly as possible in the collieries in their areas.

One of the significant passages in Lord Hyndley's message is that in which he says "The council leave it to divisional councils to decide the details, but they have asked me to remind you of the importance they attach to the more general adoption of arrangements which give an opportunity to all to produce and earn according to individual capacity. The need for more coal quickly is vital. We did well last year. This year we must do better still."

U.S. to Make 105 M. Tons of Steel

WITHIN two years, the largest expansion programme ever undertaken by the American steel industry will be completed and total capacity of the industry by the end of 1952 is expected to reach the record level of 105.75 million tons annually. In two years the industry will have increased capacity by 6.363 million tons. The United States Steel Corporation alone will increase its capacity by 1.66 million tons annually through an improvement programme at Pittsburgh and Chicago by the Carnegie-Illinois Steel Corporation.

Chemical and N-F Metal Totals

Increased Production and Usage in May

DESPITE a general increase in consumption of basic chemicals in May, stocks at the end of the month were generally higher, the level of production in most cases having improved. Stocks of ammonia and phosphate rock were nearly doubled. Exceptions were molasses and industrial alcohol, stocks of which were greatly reduced. Among the non-ferrous metals, production of virgin zinc and refined lead was higher but there was a small decline in output of aluminium, tin, and magnesium. Stocks of copper, refined lead, and zinc concentrates improved.

There was again an increase in the estimated numbers employed in the chemical and allied trades. The total for May (in thousands) was 444.6 which was slightly higher than the figure for April this year and was 12.6 more than the total for May, 1949. Distribution of workers was as follows: coke ovens, chemicals and dyes, explosives, etc., 257.0 (189.2 men, 67.8 women); paints and varnishes, etc., 38.6 (27.3 men, 11.3 women); oils, greases, glues, etc., 67.0 (53.9 men, 13.1 women); pharmaceuticals, toilet preparations, etc., 82.0 (42.9 men, 39.1 women).

These figures and the table below are abstracted from the *Monthly Digest of Statistics*, No. 55 (HMSO, 2s. 6d.)

	May, 1950 Thousand Tons			May, 1949 Thousand Tons		
	Production	Consumption	Stocks	Production	Consumption	Stocks
Sulphuric acid	156.1	159.0	—	135.2	139.0	—
Sulphur	—	31.3	90.7	—	24.2	80.5
Pyrites	—	18.4	74.5	—	20.2	67.0
Spent oxide	—	16.3	181.9	—	16.0	169.9
Molasses (cane and beet)	10.6	36.7*	174.8	10.9	24.5*	283.5
Industrial alcohol (mil. bulk gal.)	3.29	3.35	0.51	1.77	1.94	4.90
Ammonia	—	5.86	11.17	—	6.94	5.91
Superphosphate	20.1	18.7	—	17.6	17.6	—
Compound fertiliser	180.5	179.3	—	122.1	94.4	—
Liming materials	—	603.4	—	—	537.7	—
Nitrogen content of nitrogenous fertilisers	22.34	26.59	—	21.25	18.66	—
Phosphate rock	—	87.0	314.3	—	82.5	179.8
Virgin aluminium	2.59	13.1	—	2.68	15.6	—
Virgin copper	—	31.2	124.3	—	25.8	117.5
Virgin zinc	5.42	20.1	49.8	4.99	14.3	60.7
Refined lead	6.29	14.1	65.3	2.86	11.5	47.3
Tin	2.20†	4.13	—	3.13	1.79	20.4
Zinc concentrates	—	13.5	62.6	—	11.4	31.3
Magnesium	0.32	0.32	—	0.55	0.43	—
Pig iron	186.0‡	143.0‡	490.0	187.0	143.0	260.0
Steel ingots and castings (including alloys)	319.0‡	—	1,326.0	316.0	—	1,121.0
Rubber: Reclaimed	0.57	0.59	2.41	0.43	0.48	3.46
Natural (including latex)	—	4.50	39.0	—	3.65	46.0
Synthetic	—	0.05	0.83	—	0.07	1.86

* Distilling only. † April. ‡ Average of five weeks.

American Packaging Methods

A REPORT is to be published in the Autumn on U.S.A. packaging practice, prepared by the specialist team on packaging, headed by Mr. G. M. Ashwell, packages advisor to I.C.I., Ltd. The team recently returned from America after a visit under the auspices of the Anglo-American Council on Productivity. The entire team has been invited by the Institute of Packaging to answer any questions and to discuss the report at three open meetings of the Institute of Packaging in October. Admission to the meetings is not restricted to members of the Institute. Any executive with a *bona fide* interest in packaging will be admitted.

The three meetings will be held on October 5 at 6 p.m. at the Waldorf Hotel, Aldwych, London, W.C.2; October 11 at 2.30 p.m. at the Houldsworth Hall, Deansgate, Manchester; and October 16, at 6 p.m. at the Imperial Hotel, Birmingham.

The heightened interest in packaging is reflected by the fact that all the ground floor and one-third of the first floor space at the National Hall, Olympia, London, has already been let for the second National Packaging Exhibition to be held January 30-February 9, 1951 inclusive.

THE NEXT BIF

Record Number of Applications

AN advance announcement from the BIF Press Office of the Board of Trade indicates that the 1951 British Industries Fair will be held in London, at Earls Court and Olympia, and at Castle Bromwich, from April 30 to May 11. Applications for space are said already to have indicated that this will be the largest and most comprehensive trade fair. By the end of July twice as much space had been applied for as at the corresponding period for any previous Fair.

The closing date for applications is August 19 and every effort will be made to accommodate all requests received, although sizes of individual stands may have to be limited.

The division of trade groups between Earls Court and Olympia has not yet been decided, but it is unlikely that there will be any change in the division adopted for the 1950 Fair, when chemicals were displayed at Olympia and plastics at Earls Court, although the position of the various groups within the buildings may be revised, particularly at Earls Court.

Chilean Potash Nitrate

THE Nitrate Corporation of Chile, Ltd., announces that the price of Chilean potash nitrate, containing about 15 per cent nitrogen and about 10 per cent potash, in lots of six tons or more, delivered Great Britain (c.i.f. main ports Isle of Man), will be £23 17s. 6d. per ton gross weight. The previous quotation was £19 10s. Surcharges on smaller lots will be: four tons and over, but less than six, 2s. 6d. a ton; two tons and over, but less than four, 5s. a ton; one ton and over, but less than two, 10s. a ton; two cwt. and over, but less than one ton, 20s. a ton. This quotation applies to supplies expected to arrive some time in September.

Rubber Specialists to Meet

RUBBER chemists from England, France, Italy, the Netherlands, and Germany will participate in the first international meeting to be sponsored by the Division of Rubber Chemistry of the American Chemical Society in Cleveland, Ohio, October 11-13. The overseas rubber chemists are to present half the 50 technical papers. Among the 1000 chemists expected to attend, all the U.K. rubber groups will be represented. The chairman will be A. W. Oakleaf (Phillips Petroleum Company).

FATAL BOILER EXPLOSION

Rash Use of Pressure Steam

THE jury added a rider that there was a "gross lack of supervision on the part of the contractors," when at Chester on August 9 it returned a verdict of "Misadventure" at the inquest on Mr. Harry Catton, aged 44, chargehand pipefitter, who died in Chester Royal Infirmary on August 3, after his leg had been blown off. The accident occurred when a boiler exploded on a site of the Shell Refining and Marketing Co., Ltd., at Thornton.

Mr. Edward Davies, a foreman pipefitter, employed by Foster, Wheeler, Ltd., contractors, said they were ordered to put in a tea boiler, heated by a coil, but Catton, on loan to them from the Shell Company, suggested that a steam box should be welded under the boiler. When the boiler was tested with low pressure steam, Catton said the heat was insufficient and suggested high pressure steam. He (Davies) said Catton must get permission from the Shell company and Catton later said he had done this. The coroner (Mr. David Hughes) said it appeared Catton was doing something requiring a higher form of knowledge than he possessed.

Dust and Fumes in Ironfoundries

THE Joint Iron Council, in association with the Council of Ironfoundry Associations, is to intensify work upon problems of dust and fumes in ironfoundries and to provide an advisory service on how best to deal with them in foundry practice. The work is being carried out through the British Cast Iron Research Association, a large part of whose finance is derived from the Joint Iron Council. A specially appointed Foundry Atmospheres Committee of the Research Association is supervising the work.

Chemical Employment

THE level of chemical employment in May remained almost unchanged compared with the previous month, the total (in thousands) being 444.6 as against 444.0 in April. Detailed distribution, as shown in the *Ministry of Labour Gazette*, was as follows: Coke ovens and by-product works, 17.1; chemicals and dyes, 203.2; pharmaceuticals, etc., 34.0; explosives, etc., 36.7; paint and varnish, 38.6; soaps, glycerin, etc., 48.0; mineral oil refining, 36.3; oils, greases, glues, etc., 30.7.

AUTOMATIC PROCESS CONTROL

Co-ordinated Regulating Instruments

by LEO WALTER, A.M.I.Mech.E., M.S.I.T.

THE modern trend in chemical engineering is to use what is called in the U.S.A. " Robotisation," or more commonly " Engineered control," as the application to a chemical process of several co-ordinated control instruments. All the plant operator has normally to do for fully automatic control is to push a button, and the process starts, one or several automatic control instruments taking over the duty measuring and controlling process factors.

Delicate Balance

In practice, the plant operator has, of course, continuously to supervise these " robots " in order to make sure that they work satisfactorily. This supervision of instruments must be performed, regardless of the fact that the more elaborate control systems are supposed to work without fail.

Where several controllers have to work together, they are liable sometimes to produce erratic control, caused by a tendency to hunting. This develops much more readily in engineered control than in a single control instrument. If in a plant, having various controllers working together, one instrument starts hunting for its correct position, this can bring a swinging component into the process, which caused a second regulator to start to " swing ", and so on.

This falling out of gear can happen quite suddenly, perhaps after a new process has worked satisfactorily for a short time, or even after a process has been satisfactorily controlled for some years.

The cause of failure of engineered control can be either in the process, or in its instrumentation, and investigations are not always easy. Chart records, valuable as they are in giving data on process variables and on the all-important time factor, do not always disclose the cause for unbalance of the control system.

Human interference, or changed quality of raw material, or sometimes altered energy conditions from outside (fluctuations of voltage, of steam pressure of temperature or of pressure of cooling water supply) can be the cause of the trouble. Gradual development of scale or deposits on heating surfaces up to a point when heat transfer becomes too low can be the cause, or increased friction in bearings of moving parts of the plant.

To find these causes for erratic control needs more than the skill of an instrument mechanic, who can bring a controller into working order, but may be less familiar with control theory. It requires the knowledge and skill of the works chemist and the plant engineer, and co-operation between the workpeople and the instrument expert.

Curing trouble of this nature inevitably requires from the chemical engineer a sound basic knowledge of the design and function of instruments and how their function is correlated to that of the plant. For engineered control, an additional knowledge of relation of each instrument to other co-ordinated controllers is also required.

To gain this knowledge by trial and error methods is waste of time, energy and money. The bibliography at the end of this article mentions some of the literature forming a source for study of fundamental control theory, without which no chemical plant engineer can expect to know his instruments intimately enough to be able to cure troubles, which often can be overcome by re-adjustment of control instruments.

Choice and Installation

A controlling instrument must be reliable, possess inherent stability, have good response without being over-sensitive, and be easily handled. The instrument choice depends on the required closeness of control, and on process characteristics in general. For engineered control the factor of interchangeability of parts also comes into the picture.

In thermostatic problems it is known that large or otherwise difficult process lags require instruments having an anticipating control component, which may be reset (integral), or reset plus rate (second derivative). The increasing use of potentiometric controls, based on electronic amplification results from the small instrument lags of this type, combined with the possibility to transmit control impulses over great distances, i.e., to a central control panel. This latter remote control can, however, also be achieved by the use of pneumatic transmitters, or by applying pneumatic-electric combinations.

In pressure control, the process time lags

are usually negligible, and the simpler modes of control are applicable, in instances where moderate accuracy of control suffices. For engineered control, it is, however, sometimes important to apply reset (integral) control, and to have available means for adapting responsiveness of an instrument to other controllers.

Control of rate of flow often require stabilised instrument types, as does ratio control, whereby the rate of flow in one pipeline is controlled from the rate of flow in another. The crux of the problem here is to choose the correct orifices, which is not always easy with dirty or highly viscous or corrosive fluids, and to ensure the correct pressure differential by keeping the measuring orifice clean. To keep the corrosive fluid away from the instrument requires the use of inert sealing fluids, and these must be regularly checked and replaced. Good co-operation in engineered control of a pressure controller with a rate of flow controller requires means for adjustments of both instruments, which should be preferably of the reset type.

Level Control

For engineered control, liquid level is often interconnected with rate of flow control. The ordinary ball float valve for control of filling of open-topped vessels is increasingly being replaced by either a cam-operated lever valve; or by a controller using a shaped displacer, suspended on an adjustable spring; or by a pneumatically operated level controller, producing quick filling, but much gentler valve movement near the desired level.

Combined liquid level and flow control could be effected by a level controller which readjusts the control point of a rate of flow controller working on differential pressure. The draw-off from the vessel is thus solely controlled from maintained liquid level. The valve opening will be varied to produce a rate of outflow for keeping the level in the surge tank steady, irrespective of the varying rate of inflow.

A flow control problem for hot water takes a rather different form. Boiling pans with jackets receive the heating water at full flow, but after it has been treated by a temperature mixer controlled by a thermostatic diversion valve. Another temperature

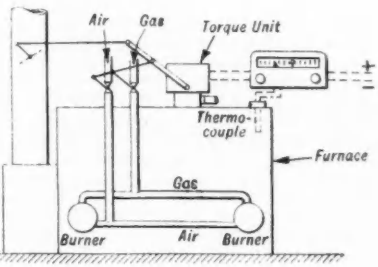

Fig. 1

regulator controls the heater temperature by regulating steam admission. Where very accurate control is required, the problem becomes much more elaborate.

Density control is used in chemical processing more than in any other branch of industry, and the mixing of two fluids is often automatically controlled.

A continual problem in combustion control for oil or gas burners of industrial furnaces and steam boilers is the continuous maintenance of the correct ratio between air and fuel, irrespective of load. Electrical control of two gas burners can be effected by automatically adjusting the rate of flow of air and of gas, depending on heat requirements. A pyrometer-controller receives impulses from a thermocouple inserted in the furnace roof, and these control impulses are transformed into control movement in a torque unit, comprising a motor which actuates the air and gas valve simultaneously. (Fig. 1.)

This air/fuel ratio control is often used in conjunction with furnace pressure and temperature control.

Combustion control has reached a very high standard for steam boilers in power stations, where it forms part of the general boiler control outfit. Unfortunately, development has not yet produced low-priced

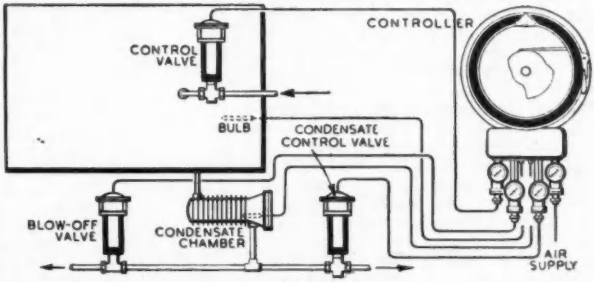

Fig. 2

standard control units for thousands of medium-sized and smaller Lancashire type and water tube steam boilers, in which fuel waste continues due to inefficient operation by hand.

Programme control automatically varies the set point of a controller according to a predetermined time schedule. The modern control of dye-vats increasingly uses programme control since low temperature dyeing has been introduced. Many chemical reaction processes could be better operated in this way, but the higher cost of programme controllers, and a certain shyness in using rather elaborate looking instruments in the small works, have delayed the wider use of programme controllers.

For Timed Processes

The use of a modern instrument with cam attachment is shown in Fig. 2 as it would be used for chemical processes where a time schedule for temperature and/or pressure is involved, or where a given rate of rise and duration of hold is indicated. A modern time cycle control instrument works on re-adjustments of the set point, the operation depending upon a cam cut to the desired temperature/time cycle.

The diagram shows a programme instrument with cam attachment, controlling steam supply to a retort, with condensate and blow-off control. More elaborate engineered control adds automatic pressure and pressure relief, and sometimes automatic admission of cooling water, etc., as in canning.

As an example for an elaborate engineered control problem, the Taylor system of fractionating column control is worthy of study. (Taylor Instrument Company, Rochester, U.S.A., and Short and Mason, Ltd., London). The purpose of a fractionating column is to separate by heating mutually soluble liquids of different boiling points. There is an overhead product, and a bottom product whose separation depends upon their boiling temperature. Primarily, the concentrations of both products have to be kept under control, and secondarily, a number of auxiliary process factors have to be controlled, such as feed rate, the draw-off rate at the bottom outlet, condenser water and static pressure within the column, etc.

Most continuous distillations use the bubble plate system. The vapours rise within the column, and bubble out under slotted caps. In order to separate two components, heat is applied, and the component with the lower boiling point evaporates, and leaves the column in a volatile form. Part of the drawn-off bottom distillate is returned in form of ' reflux " at the top of the column, in order to enrich the vapours.

When a control system is applied control of feed rate is performed by a recording rate of flow controller, deriving its impulses from differential pressure of an orifice. A proportional, or more frequently reset (integral) control is used for adjusting the control valve in the crude oil supply pipe. An average liquid level controller sees to it that the set point of the inflow controller to the column is automatically readjusted, according to level in the reflux accumulator.

The next point of control is where the overhead product is withdrawn and is operated by reflux control. Because an interchange between vapours and liquid is necessary to achieve the desired uniform vapour concentration, the quantity of reflux has to be regulated, for example, $\frac{1}{2}$ to be returned, and $\frac{1}{2}$ to be drawn off. Composition determines thus rate of vapour withdrawal, and of reflux feed, and the process variable most closely related to composition is temperature.

The next point of control is the cooler, where inflow of cooling water is regulated from the liquid level in the reflux accumulator. A buoyancy float type of level controller is used, which produces reduced condensation with increased liquid level, and vice versa. All gaseous substances are withdrawn from the column and from the reflux accumulator through the gas line.

Fully Regulated

A back-pressure recorder-controller in the gas line ensures that the column operates under desirable fixed gas pressure for plants operating on positive pressure (above atmospheric). A pump removes the liquid from the reflux accumulator, and a reflux flow controller regulates feeding back to the column.

The flow of liquid from the bottom of the column is to a heat exchanger vessel, a reboiler, which is heated by steam-controlled coils. A liquid level controller of the ball float type, having a narrow proportional band is applied, acting on a control valve in the draw-off pipe of the bottom product.

A temperature regulator operates a control valve for steam admission to the reboiler, and reset control with valve positioner is usually applied in view of process characteristics. The thermostat bulb is located in the reboiler vapour line back to the column. Application of controlled heat in the reboiler ensures suitable composition of the bottom product.

It is not desirable to go further into the intricacies of fractionating control, which needs much specialised experience, but the

example helps to emphasise the widespread uses of instruments for engineered control.

The writer, before the war, equipped one of the most up-to-date small oil refineries in Central Europe with an entire control outfit, using British, American and German automatic controllers. The layout and modes of control were worked out in close co-operation between chemists, plant engineers and control experts with very satisfactory results (a note in a newspaper mentioned recently that the plant is in full operation today).

The above example is only one layout possibility for petroleum and distillate stabilising columns for petroleum fractionating. It is perhaps unnecessary to stress the urgent need for ample adjustability of each control instrument, in order to achieve perfect "engineered" control.

It cannot be emphasised too much that the correct choice of control method and of type of control instrument is most essential, even for straightforward control problems. This applies even more forcibly to problems where the function of one control instrument influences other controllers dealing with process variables in the same plant equipment.

To make application of engineered control easier, the designs of modern chemical plants should be worked out with due consideration of good controllability in the drawing-board stage, and experience on pilot plants should be fully explored in order to improve controllability of the final full-scale plant.

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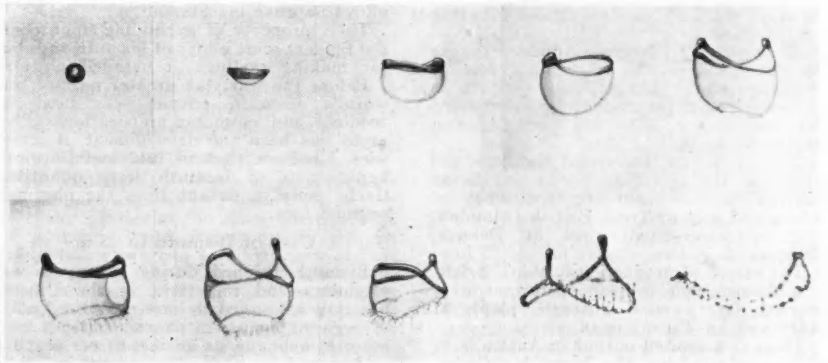
Canada's Raw Materials

THE fortunate position of Canada in possessing raw materials for chemical industry, second only in amount to that of the U.S.A., was mentioned by A. H. Smith, president of Monsanto (Canada), Ltd., in an address to the Chemical Institute of Canada, in Toronto recently. Although not always advantageously located, there are plentiful supplies of coal, oil, natural gas, water power, timber and various minerals, items lacked by many other countries. Canada's domestic market provides a sufficient outlet for many items.

The Disintegration of a Water Droplet



THE Ministry of Supply was responsible for the production of this remarkable series of pictures which help to make substantially clearer irregularities in the dispersion of water, and indirectly of water suspensions, in a high speed air stream.

Water drops of 2.6 mm. diameter were allowed to fall into a small transparent vertical wind tunnel, down which a stream of air was steadily maintained. They were photographed at various stages of their break up by means of a flash discharge tube operated photo-electrically by the falling drop. At a critical velocity of the air stream, 22.5 metres per second, the drop became flattened, then was blown out into a bag form, attached to a roughly circular rim. The bag then burst, producing a shower of very fine droplets. The later disintegration of the ring produced much larger droplets.

These photographs formed part of the recent exhibition of high-speed photography organised by Ilford, Ltd.

Industrial Value of Bismuth

Expanding Range of Metallurgical Applications

INCREASING attention has been given in recent years to the potential industrial applications of bismuth, particularly its metallurgical uses.

Bismuth minerals are usually found in pegmatites, granites and gneisses, generally in subordinate amounts associated with other economic minerals, from which they are extracted as by-products. All occurences of bismuth ores are of magmatic origin and are usually found in association with copper, tin, silver and gold ores.

Limited Exploitation

A comprehensive survey of the sources, production, properties and applications of bismuth has been provided by *The South African Mining and Engineering Journal* (Volume 61, part 1) which pointed out that this metal has so far only been mined in the Union to a very limited extent. It is, however, of fairly widespread distribution and occurrences in Namaqualand are regarded as most promising, primarily because of the possibility that bismuth could be obtained in that area as a by-product during the production of other useful minerals.

The world's largest producers are Mexico and Peru. There are no important deposits in the U.S.A., but bismuth is recovered as a by-product from imported lead and copper ores and from Mexican bismuth-lead bullion bars.

Canada is an important producer of bismuth, the Canadian production being derived mainly from the treatment of silver-lead ores at Trail, British Columbia, and of silver-cobalt ores at Delores, Ontario.

The extent of production in the U.S.S.R. is unknown, but in 1940 operations were started by a new bismuth plant at Adrasinan in Tadzhikistan.

There is a limited output in Australia as a by-product from the bismuth-tungsten and tungsten-molybdenum mines in Queensland.

Europe is the largest consumer of bismuth. World consumption has enormously increased in recent years, and is believed to have approximately quadrupled between 1940 and 1942. The leading bismuth compounds are bismuth subnitrate, subgallate and subcarbonate. The various bismuth compounds, salts and mixtures are used for a number of medicinal preparations.

Bismuth salts are used with oxides of other metals to impart colours to porcelain and with gold for gilding it. Bismuth nitrate gives to porcelain a colourless irridescent glaze. The salt is also used in printing fabrics and in making optical glasses. Another use for bismuth compounds is for controlling blue mould on tobacco.

Alloys of bismuth are important because of their low melting point and because their volume either expands or is unchanged upon solidification from melts. Alloys with lead, tin and cadmium have melting points which are much below those of the constituent metals. Several of these low-fusion alloys melt below the boiling point of water, and some can even be softened by the heat of the hand.

Low-melting alloys of bismuth (43-55 per cent) with lead, tin and cadmium are used in spotting fixtures, die setting, anchoring machine-tool bushings and tube bending. Similar alloys, some with melting points as low as 117° F., are used in sprinkler apparatus and fire-detector systems. Additions of 0.1 to 1.5 per cent bismuth to stainless steel, copper and aluminium alloys improve machinability.

Their property of expanding upon cooling renders some alloys of bismuth suitable for making castings of detailed objects.

Before the war, the greater part of the world's bismuth output was used in medical and cosmetic preparations. So rapid has been the development of other uses, however, that in 1942 metallurgical applications of bismuth were quantitatively more important than the pharmaceutical uses.

Uses of Bismuth in U.S.

Bismuth shipped during that year by producers and importers in the United States is estimated to have comprised only 45 per cent for use in pharmaceuticals and other compounds, as against 31 per cent in solders and bearings, 15 per cent in spotting fixtures, die setting, anchoring machine-tool bushings and tube bending, and 9 per cent in miscellaneous applications.

Despite the very substantial increase in output which has taken place, the expansion of metallurgical uses should assure producers of a fairly stable market for a metal which, on account of its relative scarcity, seems unlikely to be affected by serious problems of price fluctuations and over-supply.

A NON-MAGNETIC MASS SPECTROMETER

Industrial Possibilities Using an R-F Field

A THREE-STAGE non-magnetic spectrometer, employing the principle of velocity selection, has recently been developed by Dr. Willard H. Bennett of the U.S. National Bureau of Standards. In the new spectrometer a radio-frequency field replaces the usual magnetic field. Combining unusually simple operation with small size, light weight, and high sensitivity, the instrument holds promise for applications in several fields of science and industry.

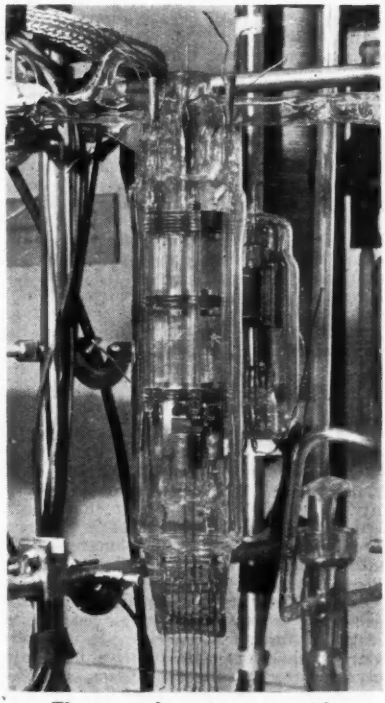
In ordinary mass spectrometers a high intensity beam of ions is bent in the field of a large iron magnet, passed through a narrow slit, and then focussed accurately on a narrow receiving slit.

The non-magnetic mass spectrometer uses neither bending or focussing. Ions produced in the ionisation chamber travel in parallel paths through the tube, which is a glass cylinder 8 in. long and 2 in. in diameter. Three sets of three tungsten wire grids are spaced along the tube to form the three stages. A radio-frequency potential is applied to the middle grid in each stage. An additional grid, with a negative potential applied, follows the final stage and, in the absence of r-f potential, turns back any electrons that may have arisen anywhere along the tube. Following the final grid is a collector plate whose potential is sufficiently positive to repel all but the desired positive ions.

Maximum Energy per Stage

The distances between grids, and between stages, are selected very accurately so that for any particular ion mass there will be a single definite frequency of the r-f potential which can speed up ions of that mass as they pass through each stage. The increased speed of these ions enables them to overcome the opposing potential on the collector while all other positive ions are turned back. Successive distances between stages must be chosen so that the r-f potential will complete an exactly integral number of cycles during the time it takes for an ion of the desired mass to travel between stages, picking up maximum energy in each stage.

The best combination of these integral numbers for a three-stage tube is found to be 7 and 5, and in actual operation the seven-and-five cycle tube has completely separated the isotopes of chlorine. From this observation it is estimated that a four-stage tube, using integral numbers 13, 11, and 7, should resolve masses differing by only 1 per cent.



The new three-stage assembly

The spectrometer can utilise all the ions that can be made to emerge through a grid several centimeters in diameter, and a new kind of positive ion source has been developed to take advantage of this. A spiral filament delivers an ionising electron current of 100 milliamperes through a double grid attached at one end of a hollow metal cylinder 3 centimetres deep. The far end is closed by a grid and near it is another grid at a negative potential which turns back all electrons and draws positive ions out from the cylindrical enclosure. At a pressure of 4×10^{-5} mm. of mercury the source delivers a positive ion current of 100 microamperes.

By an appropriate change in ion source

and reversal of potentials, the spectrometer lends itself to the study of negative ions, an important feature of the new instrument. Since negative ions are, in general, much less abundant, when they exist at all, the unusual sensitivity of the Bennett spectrometer is a great advantage in the study of negative ions.

In the development of vacuum tubes, as, for example, power transmitting tubes, a spectrometer of this type can be of great assistance in analysing gases and vapours evolved from the heated electrodes.

Surface reactions are another group of processes for which the new spectrometer can be used, separately analysing the positively or negatively charged components. In gaseous discharges, the instruments can be used for direct analysis of the ions without magnetically disturbing the discharge.

One of the urgent needs of the U.S. Bureau of Mines is an instrument which can be used in the field for the analysis of small percentages of hydrogen in the manufacture of helium. The new spectrometer has adequate sensitivity and resolution for this task, and can be readily adapted to automatic operation.

Similarly, the new instrument could be used for continuous observation of the air in an enclosed space, giving warning of the presence of dangerous components such as hydrogen or chlorine. In addition, an active project is now under way at the U.S. National Bureau of Standards to adapt this instrument for use as an extremely sensitive carbon monoxide detector. The low weight and compactness of the non-magnetic spectrometer also offers a way to settle the question of the chemical composition of the upper atmosphere.

The non-magnetic mass spectrometer is now being adapted to the rapid scanning of mass spectra. Present methods permit sweeping twice a second through the mass range from 10 to 50, displaying the measured mass components directly on the screen of a cathode-ray oscilloscope. The scanning is accomplished by sweeping the ion accelerating voltage from 50 to 250 volts, while modulating the r-f potential with a 1000-cycle signal.

New Uses for Tri-butoxyethyl Phosphate

FOR a number of years, tri-butoxyethyl phosphate, sometimes known as tributyl "cellosolve" phosphate, has been used as a plasticiser for synthetic rubbers, producing cured stocks with many excellent properties, including flexibility at extremely low temperatures.

More recently, tri-butoxyethyl phosphate has been successfully employed as a plasticiser for vinyl plastics. It is particularly valuable as an additive for vinyl polymers used in film production, because it accelerates milling and fluxing and facilitates extruding and calendering. Its other advantages include low temperature flexibility, permanent flexibility, low surface tension, resilience, good drape and handle, non-inflammability, and stability when subjected to ultra-violet radiation. The main disadvantage consists of a tendency towards migration of the plasticiser, unless this is retarded by careful compounding and use of special non-migrating plasticisers.

The principal industrial uses of tri-butoxyethyl phosphate can be summarised as follows:—

1. Because of its low surface tension at low viscosity it is particularly suitable for making plastisol pastes, such as PVC.

2. Tri-butoxyethyl phosphate possesses strong solvent powers for alkyd resins, gums, varnishes, lacquers, etc., and it is recommended for use as a paint remover and brush softener.

3. In concentrations of 1-2 per cent it is useful as a defoaming agent.

4. Rusted metal parts can be quickly cleaned in tri-butoxyethyl phosphate, which has no corrosive effect on the metal itself. It has been suggested as a possible additive in penetrating oils.

5. The low viscosity of this compound (12.2 centipoises at 20°C.) and extremely low power point (−70°C.) make it of interest as an additive in low temperature lubricants.

Tri-butoxyethyl phosphate is a colourless liquid with a mild ester-like smell. It has a freezing point of −70°C. (viscous liquid) and flash point 435°C. (224°C.). The mid-boiling point at 4 mm. is 222°C. and vapour pressure at 150°C. 0.10 mm. mercury. The solubility of tri-butoxyethyl phosphate in water is 0.11 per cent and 25°C. and the solubility of water in tri-butoxyethyl phosphate is approximately 7.3 per cent at 25°C. Tri-butoxyethyl phosphate is completely soluble in petrol, soluble to the extent of 50 per cent in mineral oil, freely soluble in most other organic liquids except glycerin, glycols and certain amines.

Practically all resins are soluble in tri-butoxyethyl phosphate, the least soluble being acrylic resin and the gum, damer.

WASTE TAR AS A CHEMICAL SOURCE

The Development of Valuable Derivatives

by H. T. PINNOCK, M.A., F.R.I.C., F.C.S., M.Inst.F.*

IN the manufacture of producer gas by the Mond ammonia recovery process, the tar produced differs greatly from that made during the manufacture of town gas, whether made in vertical or horizontal retorts.

At the works of the South Staffordshire Mond undertaking at Tipton, this tar in the early days of the company caused a lot of trouble. The tar distillers did not want it, as it was not only difficult to distil, but the oils produced from it were so different from the ordinary run of tar oils that they were difficult to dispose of. Mond tar oils contain no benzol, naphthas or naphthalene.

The board of the former gas company, largely at the instigation of Sir Alfred Mond (later the first Lord Melchett), decided that the tar must be thoroughly investigated to see whether it contained anything of special value for industrial purposes.

The work subsequently carried out laid the foundations on which were built up the range of germicidal products and anti-corrosive agents and preservatives, handled by two subsidiary companies, Monsol, Ltd., and Melanoid, Ltd., which are now controlled by the West Midlands Gas Board.

Effect of Increased Molecular Weight

As regards the disinfectants, which are handled by Monsol, Ltd., it was very soon found that the tar oils contained large quantities (about 35 per cent) of the higher homologues of phenol and other poly-hydroxy compounds of high molecular weight.

It was well-known that, everything else being equal, in respect of the phenols, the higher the molecular weight the greater the germicidal efficiency and the lower the toxicity of the product. It was likely, therefore, that a very efficient germicide could be produced from Mond tar oils, although it was not realised until later how efficient this germicide would prove.

Eight years' research work in isolating the best fractions, devising the best means of emulsifying the very insoluble products, conducting a long series of bacteriological investigations and clinical trials at various large hospitals, resulted eventually in the Monsol range of antiseptic and germicidal preparations, which are now well-known and appreciated by the medical profession and the public.

The Monsol products combined in one germicidal base five properties which had not hitherto been brought together in one preparation. These were:—

1. A high germicidal efficiency almost unimpaired in the presence of organic matter. This was a most important point as many preparations, e.g., iodine, the hypochlorites and permanganates, lose almost the whole of their efficiency in the presence of blood, pus and serum.

2. Remarkable freedom from irritant effects common to antiseptics of the phenol type.

3. A high degree of penetrative power, enabling the disinfectant to deal with deeper infections than had hiherto been possible.

4. A selective action against certain organisms, notably the gram-positive organisms which are responsible for the bulk of the septic conditions normally encountered.

5. Low toxicity to human beings and the higher vertebrates.

The result was an antiseptic of great potency, which even in concentrations higher than necessary for effective action is harmless to tissues and does not impair their normal recuperative power.

The Monsol germicide and antiseptic was made up into a variety of preparations, all possessing the five properties above-mentioned. All these received extensive medical and clinical and hospital trials before they were approved.

In the past fifteen years there has been a tendency in antiseptic practice as regards liquid antiseptics to get away from the dark coloured disinfectants with a phenolic odour to a lighter coloured fluid with more pleasant odour.

In this field Monsol, Ltd., were also one of the pioneers. As early as 1928 this end was in view, but it was not until 1932 that the problem was completely solved. The company then introduced Neo-Monsol, a liquid germicide which possesses all the five properties mentioned and has in addition a much pleasanter smell and lighter colour. The active principle in Neo-Monsol con-

* An abstract of an article of which the full presentation appeared in THE GAS WORLD, (132, 3443).

sists of chlorinated tar acids or phenols derived from tar.

The other subsidiary company, Melanoid, Ltd., deals with preservative and anti-corrosive products, the most interesting of which are Tectal net and rope preservative and Tectal wood preservative, which are made from another fraction of the Mond tar oils.

The net and rope preservative is of particular interest because it provides a preservative which is acknowledged to be outstandingly efficacious, and being produced entirely from home materials it does away with the necessity for importing foreign wood tars, which have for 200 years been largely the basis of rope and net treatment.

No "Tendering" with Tectal

Where Tectal scores particularly is that its use never decreases the tensile strength of ropes, and sometimes actually increases it. Most preservatives cause a certain amount of "tendering" whereby some 10-20 per cent of the initial strength of the rope is lost after the anti-rot treatment, before any exposure to the elements has taken place.

The reason for the superiority of Tectal in producing no initial "tendering" is due to the difference of the phenolic bodies it contains as compared to those in wood tar and coal tar creosotes.

In general, rope preservatives, whether derived from wood tars, e.g., Archangel & Stockholm tar; coal tars, e.g., creosotes; Mond producer gas tar, e.g., Tectal; all depend for their preservative action on the presence of phenolic substances, the "tar acids." By the toxic action of these acids on the micro-organisms, fungoid growths and insects that cause rotting, the life of cordages is enormously increased.

Everything else being equal, therefore, it is desirable from the point of view of inhibiting microbial and similar attacks that the proportion of tar acids should be as high as possible.

There is, however, a snag here. Tar acids, either in wood tars or in ordinary coal tar creosotes, produce a definite chemical attack on the vegetable fibres of which cordage is composed, and cause the initial "tendering" to which reference has already been made. Consequently, it becomes necessary to strike a balance between the amount of initial "tendering" and the final preservative action.

It is useless to increase the percentage of tar acids to get longer life, due to freedom from microbial attack, so that the rope has lost 25 per cent or more of its original strength owing to chemical attack, before any exposure has taken place.

This fact is recognised in the official specifications for "Creosote for the Preservation of Ropes and Cordage", in which it is stated that the maximum percentage of tar acids permissible is 10 per cent.

With Tectal, on the other hand, the situation is quite different. The tar acids have no such chemical attack on the cordage fibres and cause no initial "tendering". This has been proved repeatedly, so that while the official specification for coal tar creosote calls for a maximum of 10 per cent tar acids, the official specification for Tectal calls for a minimum of 30 per cent tar acids.

The same basis is used in the manufacture of Tectal Wood Preservative. Owing to its low viscosity it has great powers of penetration into the timber, and it can also be pigmented and supplied in various colours. Timber treated with it is immune to attack from white ants, which makes it of particular value in the tropics.

The genesis of another development was the fact that at the Mond gas works at Tipton many years ago, extensive corrosion of iron and steel work occurred owing to sulphuretted hydrogen, ammonia and sulphuric acid attack. At that time, no paints tried—and very many were tried—were successful in combating this adequately, and in consequence an investigation was undertaken with a view to providing something better.

Bitumen paints or modified bitumen-oil paints were found to fill the need, and after being thoroughly proved on the works, were put on the market in a variety of grades. In one or two of these a special pitch is used, but in general it was found that blends of natural and residual bitumens and asphalts were superior, and these are now used as the basis.

Many grades are made for special purposes, and acid-resisting paints for the interior of chemical and bleaching works are a speciality.

For gas works there are grades suitable for practically all purposes, except holders, for which it is hoped to bring out a special grade next year.

Lancashire Paint Firm in South Africa

The Leyland Paint & Varnish Co., Ltd., Leyland, Lancs., expects to start production towards the end of this year at its new £150,000 20-acre factory at Mossel Bay, South Africa. Some machinery has already been installed and more is on the way. Houses have been built in the vicinity for key workers from Lancashire. The firm hopes eventually to operate also in Southern Rhodesia.

Terpene Phenolic Resins

Their Use in Wax Polish Manufacture

From A CORRESPONDENT

INDICATIVE of the versatility of terpene phenolic resins is their acceptance by polish manufacturers as major ingredients of self-polishing floor waxes, particularly the liquid bright-drying, emulsion-type polishes used for furniture and floors. These resins have the advantage of being readily compatible with carnauba and micro-crystalline waxes, and they increase the hardness and also slip-resistance of deposited wax films.

Reducing Costs

Apart from endowing wax formulations with improved polishing performance, the terpene phenolic resins, as major additives, are very economical in use and, in the proportions generally advocated—25 per cent to 50 per cent of the total wax and resin proportion of the emulsion—they tend to lower manufacturing costs. Both high and low melting point resins are today being recommended, the high melting type being about 135° C. and the low melting point grade in the region of 100° C.

The advantages justifiably claimed for terpene phenolic resins can be summarised as follows:—

1. They are readily emulsifiable and compatible with both vegetable and mineral waxes.

2. They are available in a reasonably wide range so that where special properties are required there is a specific resin available for the purpose, *e.g.*, where formulations contain oxidised micro-crystalline waxes the addition of a harder, higher melting point terpene phenolic resin is able to produce harder wax films with less tack. By careful choice of resin the manufacturer is able to exercise greater control over his polishes and to endow them with special properties.

3. They are suitable for incorporating in wax formulations to be processed or mixed in steam-jacketed equipment. The average wax kettle usually caters for wax mixes having a melting point of 100°-115° C; terpene phenolic resins are available with a melting point for 100°-135° C.

4. They do not affect the colours (wax-soluble dyes) normally employed in polishes and have no objectionable smell.

5. They are economical in use.

6. They exercise no corrosive effect on tins or other containers.

7. They are unaffected by new emulsifying agents, such as 2-amino-2-methyl-1-propanol, which has a melting point 30°-31° C. and boiling point of 165° C. at 760 mm. The higher fatty acid soaps of this emulsifying agent possess extremely high emulsifying efficiency and are stable in colour.

8. The terpene phenolic resins can be obtained with a *p*H in the region of 8 and are therefore not liable to affect the efficiency of most emulsifying agents, which appear to have a *p*H of 9-11 at 20/20° C.

9. The resins are light in colour and, moreover, they are stable and not liable to darken through oxidation.

Adoption in the U.S.A.

Wax polish manufacturers are now finding that these terpene phenolic resins are valuable for three major reasons; their inclusion in non-rub or self-polishing waxes tends to lower costs, yet at the same time they impart improved properties to the polish and therefore give better value to consumers. It is, however, important to point out that self-polishing waxes have not yet achieved the same popularity in the United Kingdom as in America, where considerable and valuable experience has been gained in the manufacture and use of this type of polish. Moreover, special terpene phenolic resins of the kind described have been developed specially for the purpose.

Compulsory Use of Alcohol Fuel in France

THE abundance of alcohol stocks in France, which will probably be doubled by the end of the year because of the unusually promising wine and sugar beet crop, is reflected in a French Government decision that 10 per cent of petrol importers' purchases must consist of pure alcohol. This will oblige them to mix petrol and alcohol as this is the only practicable way to dispose of the 10 per cent. It is believed that the mixture will be two francs cheaper than the price of ordinary petrol. A paradoxical situation may result, as the cost of petrol is about Fr.12 per litre, less tax, and the Government pays alcohol producers Fr.80 per litre.

The Chemist's Bookshelf

CHEMICAL ENGINEERS' HANDBOOK. Revised 3rd edition. Edited by J. H. Perry. 1950. New York, London and Toronto. McGraw-Hill Book Co., Inc. Pp. xv + 1942. 144s. 6d.

This is the third edition of the work first published in 1934. It differs from the previous editions not only in that it has been brought up to date, but it now has a larger page size than hitherto. This has resulted in a more conveniently handled volume, as well as allowing for larger scale graphs and diagrams, which alone would give this edition an enhanced value.

However, in the arrangement and content matter even more practical advances have been made. The book is now divided into thirty sections which are numbered and thumb-indexed. Eighteen of the original sections have been revised and a further nine have been rewritten and expanded. The authors have also taken the bold step of deleting some of the previous sections or chapters " in order to use the space for material believed to be more valuable in this handbook."

From the point of view of the chemist the most interesting addition to " Perry " will be the matter on azeotropic, multicomponent, extractive and molecular distillation. There is also a small sub-section on dialysis, which is new. The chemical engineer in turn will welcome the sections on furnaces and kilns and on size reduction and enlargement.

From the engineering standpoint it will at once be seen that the considerable changes made in this edition render it even more useful as a reference volume. Although the price of the book is high, no chemical engineer should be without access to a copy and it should be available in every works reference library.—P.M.

LA SECURITE DANS LES LABORATOIRES ET LES FABRIQUES DE PRODUITS CHIMIQUES MINERAUX. Francis Barillet. 1950. Paris, 8 Rue de Miroirnesil.

A wealth of basic information about the toxic potentialities and characteristic effects of a wide range of chemical materials is comprised in this substantial addition, the fifth, produced on behalf of l'Industrie Chimique and le Phosphate Reunis. The treatment of most of the substances follows the same plan and is chiefly concerned with their effects upon man and incorporates a good deal of semi-clinical observation. Included now is a chapter (of 21 pp) reviewing the radio-active materials and radiations of various kinds. This does not, of course, throw new light on this new potential source of danger to laboratory and other workers, but it usefully defines its extent and likely avenues of attack. Sections deal with preventive measures, control and medical surveillance of those who may be exposed to harmful radiations. The 21 chapters are concerned with these metals and their compounds: lead, thallium, mercury, tin, gold, manganese, iron, nickel, cobalt, chromium, platinum, iridium, osmium, ruthenium, palladium, uranium. In a further part (3) are similar studies of the benzene group, petroleum products and CCl_4.

A CONCISE PHARMACOLOGY AND THERAPEUTICS. F. G. Hobart and G. Melton. 1949. London: Leonard Hill, Ltd. Pp. xxviii + 234. 21s.

This concise summary of applied pharmacology up to the end of 1948 is the third edition of the work which first appeared in 1937. Topics dealt with in this edition afford fresh information on vitamins, sex hormones and the antibiotics substances, in addition to the useful material previously presented. The introduction observes that proprietary names tend to be confusing; the author might have clarified matters by more systematic indexing and by placing the proprietary index next to the general index at the end. There also appears to be a lack of correlation between the nomenclature used and that given in the BP 1948 and the BPC 1949. For example, Phenoxetol appears on pages xxv and 165 with that spelling, but on page 232 it is given as Phenoxytol, and in the index of proprietary drugs the manufacturers are indicated by the designation Ni, which does not appear in the key to manufacturers on page ix. The new name of this compound is, in fact, Phenoxyœthanol.

The book is, however, one which, despite a few minor blemishes, can be recommended to both students and practitioners of pharmacology.—H.D.T.

WIDENING USE OF WELDING PROCESSES

*Construction and Repair of Chemical Equipment**

THE greatly increased need for gas and liquid storage vessels on a large scale, to which the new petroleum refining programme has given a fresh impetus, suggests that there will be a proportionate increase in welding constructional techniques. The great majority of pressure vessels for oil and chemical industries are welded and welding is being applied even more freely in setting up the elaborate pipe installations which form an important part of the new refinery units.

It was recently reported that 200 welders were operating at Fawley alone and the number was likely to be increased to 300 for the work of installing the 300 miles of pipeline and similar operations on the large catalytic cracking installation, pipe stills and storage tanks.

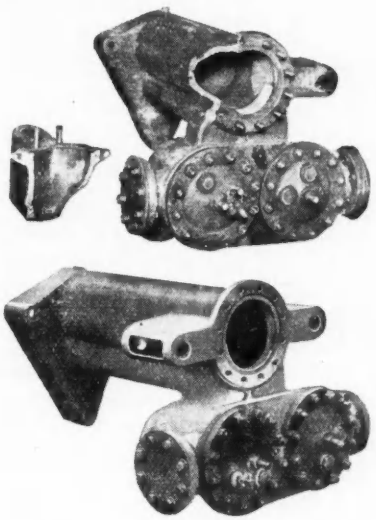
The suitability of welding for storage tank construction has been established in the U.S.A. where the spherical all-welded pressure tank is a familiar feature of the scenery in the petroleum areas. There are in this country at least two examples and it is thought there will be many more.

The resistance of this form of tank was established in a recent test of a 100,000-gall. vessel of special design. It showed no sign of failure under intermittent pressures ranging up to 1200 p.s.i. and when tested to destruction no fracture occurred until 3300 p.s.i. had been applied.

Repair of Chemical Plant

The application of welding construction to pressure and similar vessels by its comparative novelty tends to overshadow the service, at least as profitable, that welding continues to give in maintenance and repair work, particularly perhaps in respect of chemical plant. Replacement problems are generally more complicated in chemical industries than in most others because of the individual character of much of the equipment. Chemical engineering does not readily lend itself to standardisation and the simple duplication of components. Welding can, in this connection, enable substantial reduction of costs to be made. Patterns and castings can often be dispensed with, and even forgings may be replaced by flame cutting from steel billets.

Expense is, of course, not the only consideration operating in favour of welding.



[By courtesy of Barimar, Ltd

Two photographs which illustrate a highly successful piece of first-aid applied to a component vital to many chemical industries, a pump of which the fractured casing was quickly reconstituted with no loss of strength

The time factor is often even more important in chemical processes, and the speed with which most welding jobs can be carried out is a valuable recommendation.

A concrete example of rapid rehabilitation of a somewhat complicated item was work done recently on a lorry having a cast iron pressure tank of somewhat elaborate design. The pressure vessel, weighing 3½ tons, had developed several fractures in the base, one of which extended for several feet. All these fractures were made good in very much shorter time than any other means of replacement would have required. It then withstood a high pressure test far in excess of anything required under ordinary working conditions.

Apart from the repair of broken parts and the reconditioning of items that are worn and corroded, a good deal of work

(*continued at foot of next page*)

* This article is based on information supplied by Mr. C. W. Brett, managing director of Barimar, Ltd.

METAL RECOVERY

A PROCESS known in the smelting industry as "slag fuming" is now being used in the United States and Canada to recover large quantities of zinc, lead and other critical metals.

During and since the last war, three installations of slag fuming equipment for recovering metals from slag dump residue have been made in the U.S.A., according to the Babcock & Wilcox Company, which has worked closely with the smelting industry in developing the equipment. The first installation of fuming equipment was in the Kellog, Idaho, plant of the Bunker Hill and Sullivan Mining Company. This operation recovers 40 to 45 tons of zinc, in addition to a smaller amount of lead from approximately 400 tons of slag daily. Now being erected at Flin Flon, Manitoba, in the Canadian Northwest, is an equipment with which the Hudson Bay Mining and Smelting Company will treat an 800,000-ton residue containing about 26 per cent of zinc.

In slag fuming, zinc or lead, as vapour or fumes, is extracted from the surface of molten slag and is converted into a metallic oxide for further processing into finished metal.

Technical and Scientific Register

THE number enrolled on the Technical and Scientific Register at June 12 was 5366 according to the July report of the Ministry of Labour. This figure included 3443 registrants already in work who desired a change of employment; 709 students provisionally enrolled and 1214 registrants (including 524 ex-Service men and women) who were unemployed.

Vacancies filled during the four-week period May 16 to June 12 totalled 217, including 71 ex-Service men.

WIDENING USE OF WELDING PROCESSES

(*continued from previous page*)

is being done in modifying existing plant. Sometimes this is to eliminate obsolete parts although such work is often designed to meet the needs of new processes. Such alterations are often done speedily by the application of scientific welding and there are many instances in which it would be hard to specify any practicable alternative, apart from the procuring of entirely new equipment. It is in circumstances of this kind that scientific welding is making its most conspicuously useful contribution to chemical equipments.

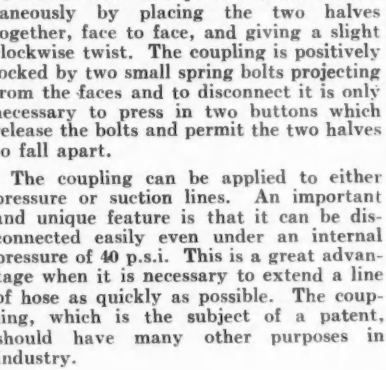
NEW HOSE COUPLING

AN improved coupling for hoses which can be opened under pressure has recently been designed by Mr. A. Bailey of the new Joint Fire Research Organisation, Boreham Wood. Tests have shown that it avoids the failings of existing types and it should be an important advance, in particular in the design of fire-fighting equipment.

Simplicity

The characteristic of the new coupling is its simple construction and it will stand rough treatment. It consists of only two main metal parts for each half coupling which can be made by die casting and require the minimum of machining. The two halves are identical, so that any two lengths of hose can be coupled together at either end. The joint is made instantaneously by placing the two halves together, face to face, and giving a slight clockwise twist. The coupling is positively locked by two small spring bolts projecting from the faces and to disconnect it is only necessary to press in two buttons which release the bolts and permit the two halves to fall apart.

The coupling can be applied to either pressure or suction lines. An important and unique feature is that it can be disconnected easily even under an internal pressure of 40 p.s.i. This is a great advantage when it is necessary to extend a line of hose as quickly as possible. The coupling, which is the subject of a patent, should have many other purposes in industry.



The two halves of the coupling, showing the simple locking device

Technical Publications

INVESTIGATIONS carried out in its laboratories on the influence of precipitations at the grain boundaries on the resistance of chromium-nickel steels to general corrosion are described in the " Sulzer Technical Review " (No. 1, 1950). Corrosion phenomena was found to be due to a very small deviation from the normal in the composition of single crystals.

* * *

THE fact that liquid metals may be used as coolants in nuclear chain reactors adds to the topical interest of the information contained in " Liquid Metals Handbook ", now available from the U.S. Government Printing Office, Washington, D.C. ($1.25). Among the subjects discussed in this 194-page book—by the U.S. Atomic Energy Commission, the Office of Naval Research and the U.S. Navy's Bureau of Ships—are: physical properties of some liquid metals, chemical properties and laboratory techniques, resistance of materials to attack by liquid metals, heat transfer, and industrial utilisation.

* * *

A NEW list of the wide selection of the compounds of nickel, cobalt and selenium, and also tellurium and copper salts regularly supplied by the Mond Nickel Co., Ltd., London, is now available in booklet form. The chemicals are conveniently arranged and tabulated according to formula, metallic content, colour and form, trade or industry, and purpose for which they are used.

* * *

" HOW you Can Work Safely " is a new simplified safety manual just published in the U.S.A. by the Gray Iron Founders' Society, largest association in the American foundry industry. The booklet is attractively printed in two colours and well illustrated. It is intended for distribution to employees in any grey iron foundry, regardless of the working conditions existing in the shop. The booklet was prepared under the supervision of a committee of foundry safety experts. It covers all general and departmental safety hazards known to exist in the U.S. iron foundries, and provides a means of ensuring that each employee has the means of learning specific safety hazards applicable to his particular job. The book inaugurates a broad safety programme sponsored by the society from its headquarters at 210 National City, E 6th Building, Cleveland 14, Ohio.

[By courtesy of Chamberlain Industries, Ltd

A new tool suited to a wide variety of applications in a number of industries is the Hydroram. Portability is one of its main features and one man, with the unit and its accessories, can pull, press, lift, bend, clamp and generally perform all the functions of human hands, with 200 times the thrust

A NEW shaker for screening oil-base mud or other high viscosity and heavy muds is the shale shaker (No. 49) announced by the Link-Belt Co., Chicago, and described in its booklet No. 2336. All parts of the shaker are zinc treated. This baked-on corrrosion resisting coating penetrates the surface. It is claimed, that in two years of off-shore drilling under exposure to salty atmosphere and in the laboratory under corrosive action, this protective treatment was superior to galvanising or comparable treatment.

* * *

AN ENTERPRISING endeavour to attract the foreign buyer is the illustrated catalogue (No. 1002) published in French and now available from George Kent, Ltd., showing its range of industrial instruments. A similar edition is also obtainable in Italian, while further productions in Danish, Swedish and German are now being printed.

* * *

PROGRESS in the search for cheap and effective methods of removing sulphur impurities from synthesis gas is described in a new U.S. Bureau of Mines publication (Report Investigation 4699).

OVERSEAS CHEMISTRY AND INDUSTRY

FIVE-YEAR PLAN IN EASTERN GERMANY

Penicillin Production at Höchst

A FIVE year plan, to succeed the present two year plan, after the end of this year, has been adopted in the Soviet Zone Republic of Eastern Germany. According to this—in the view of experts a rather ambitious plan—the chemical industry is to raise its production by 82 per cent during the next five years.

Percentage Increases

The possible effects are characteristically obscure as, following the usual Soviet practice, the changes are shown as percentages of unknown figures. In detail, the projected output increases are as follows: nitrogenous fertilisers 13 per cent, phosphatic fertilisers 91 per cent, sulphuric acid 54 per cent, caustic soda 67 per cent, synthetic rubber 59 per cent, petrol 75 per cent, plastics 113 per cent, and Perlon 762 per cent. Considerably more chemical products are to be supplied to the rayon and soap industries, and it is officially stated that existing plant will have to be augmented if the targets are to be reached in 1955.

The high percentage increase projected in Perlon production is, of course, due to the fact that the present output is very small indeed. No exact quantitative figures have been released about the production of this or other chemical manufactures at present, but certain quantitative target figures have been produced in connection with the five year plan for 1955 as follows: 400,000 tons of sulphuric acid, 250,000 tons of caustic soda, 240,000 tons of nitrogenous fertilisers, 90,000 tons of phosphatic fertilisers, 60,000 tons of synthetic rubber, and 780,000 tons of motor spirit. It is, however, difficult to assess the significance of these figures.

Soviet Block Economy

While in general the Soviet zone Republic is expected to join more closely in the economic arrangements of the Soviet bloc in Eastern Europe, little has been said so far about commercial exchanges between Eastern Germany and other eastern countries in the chemical field. The East German fertiliser industry will presumably continue to receive apatite phosphates from Kola, coke and possibly benzol from Hungary. On the other hand, further efforts will probably be made to end, or at least alleviate, the dependence on chemical key products and intermediates from Western Germany. It is understood that several new intermediates are now being made at the chemical works at Wolfen.

The penicillin plant erected by Höchster Farbwerke under licence from Merck & Co., New York, is now in full production. About 400,000 million units a month can be produced at present, which is sufficient to meet all West German requirements. During an inspection by Mr. McClay, U.S. High Commissioner in Germany, on August 4 it was stated that the existing capacity could be doubled without great difficulty. Preparations are now under way at Höchst for the production of streptomycin. The cost of the penicillin plant is stated to have been Dm. 6.98 million, of which the company provided over two-thirds, relying for the rest on ERP counterpart funds and a loan from the U.S. Control Office.

The potash production in Western Germany during the April-June quarter did not maintain the high level of the January-March period. The monthly output rate fell from 76,500 tons (K_2O) to 68,200 tons. In the meantime, mining operations have been resumed in the " Riedel " works near Celle, where 100 workers are now producing 300-400 tons of sylvinite daily. Within the next twelve months the output is to be raised to 1500 tons daily and, in December, production is also to be resumed in the Königshall-Hindenburg mine. However, as the optimal potash consumption in West German agriculture alone is estimated at 900,000 tons (K_2O), the tonnage available for export will still be limited.

Ambitious Polish Programme

POLAND'S six-year plan for its chemical industry, which came into effect last year, calls for all-round increases in production, the largest of which include: sulphuric acid 191 per cent; fertilisers (nitrogen) 303 per cent; fertilisers (phosphates) 339 per cent; acetone 1804 per cent; synthetic rubber 2200 per cent; plastic materials and finished articles 1370 per cent.

Twenty-five new chemical factories are to be put into production by 1955. The manufacture of paints, dyes and colours, in particular, is to be developed.

In 1949 Poland's total chemical production was valued at 1126 million zlotys. By 1955 it is hoped that the total value will be 3750 million.

ITALY'S ESSENTIAL OIL INDUSTRY

A Survey of Modern Developments

THE importance to Italy of its essential oils industry, a reliable and increasing source of exports, has not had all the recognition it deserves, even in Italy. Many outside Italy made their first intimate acquaintance with that country's actual and potential capacity for the production of essential oils during the last International Chemical Congress in Barcelona, in the account then given by one of the principal authorities, Professor F. La Face, director of the Centro di Studio per le Essenze, which has now been reproduced in *La Ricerca Scientifica* (*20*, 6, 761-772).

The principal sources of essential oils in Italy are citrus fruits, especially the bergamot, also lavender and iris, and more recently the jasmin, which is grown on an increasing scale and contributes more and more largely to world perfumery markets. The fruits, which are found principally in Sicily and Calabria, account for the production of some 60,000 tons of essential oils per annum. Special attention is given to the bergamot, from which various grades of by-products or distillates are obtained.

These distillates are in addition to the main product obtained from the rind and differ in several respects from it. The output of distillates is relatively small, being 15-20 tons per annum. The well known petit-grain is obtained from the leaves. This has practically the same composition as its widely used namesake derived from the bitter orange, and the yield from bergamot leaves is rather better than from orange.

High Yield of Lemon Oil

Lemon oil is an important product in the citrus category and the yield from Italian lemons is relatively high, being 0.51-0.71 per cent on whole fruit, the average industrial yield being about 0.45 per cent compared with 0.2-0.3 per cent in the case of Californian or Palestine lemons. The citral content of lemon oil from Italian fruit is also higher than from Californian or Palestine lemons. Here again petit-grain is distilled from the leaves.

The proportion of the total lemon crop destined for industrial purposes, e.g., the production of essential oil, varies from 20-30 per cent (of about 300,000 tons). Of the sweet orange crop the amount available for essential oil is regulated by demand for the fruit as such, or for the juice. Some oil is obtained from immature oranges; the yield in this case is relatively high and the quality more fresh and piquant. In Italy the use of the crop for oil has declined markedly, as compared with the production in Florida, French Guinea, Spain and other countries, namely from about 150 to 50 tons of oil, representing 4-5 per cent of the total crop.

The bitter orange is grown in Sicily and Calabria exclusively for oil production. An important product is neroli oil obtained from the flowers, of which 300-400 tons annually are collected for the purpose, and yield about 1 per cent of oil very similar to the French product: esters 7.7-14.7 per cent, total alcohols 57-63 per cent, methyl anthranilate 0.71-1.37 per cent. Bitter orange blossom is to a limited extent treated with volatile solvents, yielding 0.24-0.26 per cent of the concrete oil.

Ester Content of Petit-grain

Petit-grain obtained from the bitter orange leaves (0.2-0.3 per cent) has a rather high ester content, namely 55-65 per cent in steam distilled oil and 50-52 per cent by direct heat process. Oil is also obtained from the rind or peel, to the extent of 0.4-0.5 per cent. Little use is made of mandarin oranges in this industry. As is well known, the petit-grain from the leaves of these is remarkable for its high content of methyl anthranilate—up to 64 per cent.

The author deals at some length with various technical problems, more especially the wider use of machinery for some of the operations hitherto slowly and laboriously carried out by hand. As in other industries concerned with the recovery of plant products, a first essential is the effective cleaning and trituration or pulping of the raw material to fracture the cells and facilitate recovery of the desired product. In the Italian essential oil industry the two principal machines, of relatively simple yet effective operation, are the so-called *pelatrici* and *sfumatrici*. The former are scalpers or strippers in which the fruit is thrown by centrifugal force against abrading surfaces, usually glass; the latter are pulpers, by which the material, more particularly the rind, is

subjected to a rending and tearing action.

The strippers are mostly used for bergamots and the pulpers for the other citrus fruits. In the case of bergamots, the first division of products, the operational programme, affords a crude aqueous oil emulsion on the one hand and fruit residue on the other. From the emulsion, through various operations of centrifuging obtained, and from the residue, by pressing, etc., are obtained pectin, cattle fodder, citric acid (or calcium citrate), alcohol and essential oil distillate.

Other oils include mint oils and lavender. The introduction of the Mitcham black mint variety some years ago considerably improved yields and quality. The menthol content of the Mitcham variety was up to 65 per cent. The total area under the crop, mostly in Piedmont, is about 1500 acres, and the output of essential oil some 30 tons a year. The lavender fields of Italy cover large areas in the Ligurian-Piedmontese uplands, up to about 20,000 acres, with smaller but more accessible fields in Calabria and other districts. Yields, however, are not very considerable, representing about 600 tons of the spikes from the uplands, 15 tons from Campana, and 60 tons from the Calabrian-Lucania zone. The yields of oil vary from 0.6 to 0.75 per cent, with ester contents from 18 to 40 per cent.

Increasing interest has lately been taken in jasmin cultivation, but this does not yet appear to have reached large proportions, the chief centres being in Sicily and Calabria. The yield of material is four-and-a-half tons per hectare and the total crop is about 500 tons. Extraction is usually by petroleum ether.

Another oil to which some interest attaches and for which conditions are said to be favourable is that of rose geranium. Among wild plants, besides lavender, there are several others that would probably be worth collecting for the stills if suitable organisation and marketing could be established, such as some varieties of thyme, calaminth (*C. nepeta*) and *Mentha pulegium*.

The author confirms that there are wide possibilities of various kinds for developing the essential oil and perfume industry in Italy. Natural conditions in many districts are favourable, but there is need of suitably located centres for study and research, testing and marketing. The two principal centres in Italy at present are the Centro di Studio del CNR (Nat. Research Council), of which the author is director, and the Stazione Sperimentale per l'Industria delle Essenze, Reggio Calabria.

Synthetic Fuels and Chemicals for the U.S.A.

CURRENT events, in which the campaign in Korea bulks large, and the increasing requirements in the U.S.A. for benzene and phenol have heightened interest in the Bureau of Mines investigation of these and other chemicals available in producing synthetic liquid fuels from coal and oil shale.

The major objective, which has enlisted the interest of the National Security Resources Board, is to determine the most desirable processes for producing chemicals in conjunction with synthetic fuels. Potential benefits would include the provision of a new source of those chemicals either in short supply now or expected to be in emergency; a supplementary source of aromatics of other special fuel components required by the armed forces; and reduction of the cost of synthetic liquid fuels by the co-production and sale of chemicals.

Benzene, already insufficient for current needs, constantly is becoming more important as a basic raw material. Its use in such products as synthetic rubber, plastics, nylon, and detergents readily accounts for the sharp increase in demand during the last decade.

Until recently, benzene was available only as a co-product in the manufacture of oven coke, used chiefly for metallurgical purposes. Thus, coke requirements established a ceiling on benzene production, and interruptions in either the coal or steel industry tended to create an immediate shortage with dislocations in dependent industries. For the first time, benzine is now being produced from petroleum at Texas City, Tex., where a plant has been established with an annual capacity of 5 million gall.

Benzene and the aromatic hydrocarbons generally, with phenol and other commercial "tar acids," can be produced in substantial amounts by the direct hydrogenation of coal—one of the synthetic liquid fuels processes being developed by the Bureau of Mines. Such production, while not a major programme objective, would offer a means of augmenting present and future chemical supplies, and also help reduce the liquid fuel costs.

A single commercial-scale coal hydrogenation plant, producing principally petroleum and liquefied petroleum gases, could make a major contribution in alleviating shortages.

• OVERSEAS •

New Glassware Factory for Israel

A factory for the manufacture of glassware is to be erected in Petah Tikva, Israel, for which investments are required of $100,000 and I£50,000, respectively. Reports from Israel also indicate that raw materials for the manufacture of glass, and pottery, which are now imported, have been recently discovered in the vicinity of Beersheba.

I.G. Holdings in Spain Expropriated

The I.G. participation in a Spanish chemical concern, Unicolor S.A. Colorantes y Productos Quimicos, has been expropriated by the Spanish Government, and sold to the Fabricación Nacional de Colorantes y Explosivos S.A. (FENCE) for 2,961,000 pesetas. The I.G. also owned [illegible] per cent of the share capital in FENCE which has also now been expropriated and sold for 13,455,000 pesetas.

ECA Funds for Oil Drilling

French oil companies have been allocated from ECA funds the sum of U.S. $1.3 million, to be used for the drilling of test wells in Morocco and Tunisia. Of this total, the Société Nationale des Recherches et d'Exploitation des Pétroles d'Algérie (REPAL) is to receive $720,000 and the Société Chérifienne des Pétroles $580,000.

Farben Equipment for Canada

Initial shipments of I. G. Farbenindustrie research equipment, awarded as war reparations to Canada by the Inter-Allied Reparation Agency, have arrived in the Dominion. Sixty-three crates of equipment have been received by the Polymer Synthetic Rubber Corporation from the dismantled I. G. Farben plant at Leverküsen, Germany. The equipment is reputed to be the finest in the world.

Shale Oil Refinery for Brazil

A refinery is being constructed at Pindamonhangaba, Brazil, for distilling oil products from bituminous shale mines in the Paraiba Valley, where large reserves are said to exist. The first retort has already been built and the plan for the complete plant provides for three groups each consisting of 16 such retorts. They will have a capacity of 1000 tons of shale per day, which is expected to yield some 100,000 litres of crude oil, besides a quantity of gas estimated to be sufficient for the requirements of the city of Sao Paulo and other towns in the Paraiba Valley.

Sulphur Concessions

The Mexican Gulf Sulphur Company has been awarded concessions by the Mexican Government, comprising 7500 acres, on two very large sulphur domes in the State of Vera Cruz, Mexico.

Indian Oil Seeds Industry

During the current year the production of oil seeds in India has been estimated at about five million tons, and its contribution to the national income at approximately Rs. 205 crores. The area under oilseeds in India is in the region of 23 million acres, out of a total gross cultivated area of about 276 million acres.

Canadian Lithium Source

Northern Chemicals, Ltd., is planning the erection of a 100-ton concentrator and power plant for its lithium deposit (spodumene) at Cat Lake, about 90 miles northeast of Winnipeg. An agreement has been completed with the Lithium Corporation of America, a substantial shareholder, for the sale of the first 15,000 units of concentrated ore annually.

Hong Kong Export Ban

Chemicals and some non-ferrous metal compounds are among the list of commodities of which the export from Hong Kong to Communist-controlled China has been stopped by the Hong Kong Government. Heavy buying at high prices of strategic materials by Chinese Government agents is reported to have been in progress for some time.

Chemical Fertilisers

Under the scheme of distribution of chemical fertilisers through co-operative societies in Madras State, the District Central Stores has taken over 30,000 tons of ammonium sulphate to be distributed to the ryots. Besides the wholesale stores, primary societies, market societies and other co-operative organisations will also distribute chemical fertilisers.

Magnesium Sheet Production Begins

Large-scale manufacture of magnesium sheets will be undertaken by the Dow Chemical Company in a 110-acre plant at Madison, Illinois, purchased from the U.S. Government for $1.5 million. It will be the first in the United States to make continuous rolled magnesium sheets. Military demands for sheet magnesium have increased greatly in the past month; magnesium is now replacing aluminium in aircraft and zinc in batteries.

PERSONAL

DR. E. J. HOLDER has been appointed to the board and to be general manager of Duncan, Flockhart & Co., Ltd.

DR. W. J. F. CUTHBERTSON, head of the nutrition unit, research development division, Glaxo Laboratories, Ltd., presented a paper "The Microbiological Assay of Vitamin B_{12}" at the pharmaceutical conference held at Verona, Italy, recently.

In the course of a recent visit to the U.S.A., DR. V. PETROW, chief research chemist to the British Drug Houses, Ltd., gave a lecture on "The Chemistry of Vitamin B_{12}" to the Gordon Research Conference, organised by the American Association for the Advancement of Science. He described the work carried out by the B.D.H. Research Laboratories in collaboration with Dr. Holiday and his colleagues of the MRC Spectrographic Unit of the London Hospital.

MR. DAVID RITCHIE, of T. & H. Smith, Ltd., Blandfield Chemical Works, Edinburgh, has received the degree of doctor of philosophy of the University of Edinburgh. The title of his thesis was "Synthesis of Pyrazoline Derivatives and an Examination of their Local Anaesthetic Activity."

MR. G. E. WATSON, who was manager of the vitamin oils department of the Crookes Laboratories, Ltd., has been appointed general manager in place of DR. J. C. BURGIN who is leaving England for Australia. MR. E. A. RANKIN has been appointed manager of the vitamin oils department, of which MR. E. H. HOPKINS becomes technical manager.

MR. FRANK C. COOPER, assistant lecturer in pharmaceutical chemistry at Nottingham University, has been awarded the degree of Ph.D. of the university, the title of his thesis being "The Synthesis of Amidine Derivatives of Potential Anti-tuberculous Activity."

Obituary

The death is announced, at the age of 45, of DR. OTTO A. BEECK, associate director of research, Shell Development Co., Emeryville, California.

ETS to Visit Holland

A joint meeting of the Electrodepositors' Technical Society and Studiekring Galvanotechniek (Dutch Electroplaters' Society) has been arranged for September 27-30. The programme will include two technical sessions, at which Dutch and British authors will present papers.

WELDERS' TRAINING COURSE

THE British Oxygen Co., Ltd., opened its Scottish school at Hillington, Glasgow, on August 7, and is already handling a considerable number of inquiries for training facilities. The school is designed to assist users of welding plant to achieve the maximum efficiency from plant and labour by training operators to a given standard of efficiency. Work covered by the school includes argon arc technique (of particular interest in view of the current expanded use of aluminium in the industry) all forms of oxy-acetylene welding, all forms of oxygen cutting, by hand or by machine and the ancillary processes utilising gas.

Individual firms are being invited to send workers for training to specific standards in the precise type of work which interests them. They are given a course of training, covering from two to ten weeks according to the nature of the work. Their progress is logged and reported.

OEEC Aluminium Mission

AN OEEC mission of experts from the United Kingdom, Austria, Belgium, Eire, France, Germany, Netherlands and Norway left Europe on Wednesday (August 16) under the technical aid scheme to study the recovery and use of secondary aluminium in the U.S.A. Representatives on the mission of the U.K. aluminium industry are: Mr. F. Farenden (Eyre Smelting Co., Ltd., Merton Abbey), Dr. E. Scheuer (Inter-Alloys, Ltd., Aylesbury) and Mr. R. Jones (High Duty Alloys, Ltd., Slough).

During approximately five weeks in the U.S.A. the party will study the segregation, collection and grading of aluminium scrap; the analysis, remelting and refining of scrap; and the use of scrap and of remelted secondary metal in the manufacture of cast products and of rolled, extruded and forged products.

Next Week's Events

SATURDAY, AUGUST 19

Institute of Mining and Mechanical Engineers

Newcastle upon Tyne: Lecture Theatre of North of England Institute of Mining and Mechanical Engineers. 2.30 p.m. "Third Report of the Shot-firing and its Alternatives Committee," introduced by Major R. S. McLaren, D.S.O., M.B.E., B.Sc.

International Union of Biological Sciences

Rio de Janeiro: 5th International Congress of Microbiology.

HOME

Barrier Creams

Rozalex, Ltd., Manchester, is to show on Stand 19 of the Laundry, Dry Cleaning & Allied Trades' Exhibition at Olympia (September 28 to October 7) a full range of dermatitis barrier preparations.

Prices of Oils and Fats

There will be no change in the prices of unrefined oils and fats and technical animal fats officially allocated to primary wholesalers and large trade users during the four-week period ending September 2. The Ministry of Food adds, however, that stocks of rapeseed oil are now exhausted and the published prices of £140 and £130 per ton have been withdrawn.

Home-Grown Linseed

Apart from sales for seed, which are not controlled, sales of home-grown linseed during the rest of the year must be to an approved buyer or direct to the local branch of the National Association of U.K. Oil and Oilseed Brokers, Ltd. The growers' price for linseed sold for crushing will again be £55 per ton net weight *ex* farm, on a basis of 90 per cent purity, with an increase or decrease of 12s. 3d. per ton for each 1 per cent variation.

New Nickel Alloy

The Mond Nickel Co., Ltd., announces the addition of Nimonic 90 nickel alloy to its commercially available alloys. Nimonic 90, used in gas turbine blade construction, was found to be 10 per cent better than Nimonic 80 A at 750° C. and similar superiority was observed at the higher temperature ranges. Information about the metal, in the development of which Henry Wiggin & Co., Ltd., collaborated, has hitherto been withheld for security reasons.

Continued Rise of Lead and Tin Prices

The continued trend to higher costs for non-ferrous metals has been confirmed by further higher quotations—notably for lead and tin—in the past few days. The Ministry of Supply price for good soft pig lead was raised on Wednesday by £8 to £104 per ton delivered. A rise in the charge for 99.6 per cent antimony advanced the rate from £160 to £170 per ton. The relatively meagre offering of tin on the London Metal Exchange on Tuesday influenced a further advance of £18 in the price for supplies three months hence—to £838-840 per ton.

Progress at Engineering Research Centre

Substantial progress is reported to have been made on the large DSIR Mechanical Engineering Research Station at East Kilbride. The steel structure of the first two buildings has been completed and ancillary buildings are steadily rising. Plans are now in hand for a third building.

New High Vacuum Grease

Shell Chemicals, Ltd., announces that supplies of its product Apiezon Grease "T" are now available. This grease, which is another addition to the company's range of Apiezon oils and greases for high vacuum work, has a melting point of 125°C. and a vapour pressure of approximately 10^{-8} mm. Hg. at room temperature.

To Study U.S. Metal Finishing

A team of specialists left England last week for the U.S.A. to study American methods of metal finishing, including technical anti-corrosion processes. The team of 13 has as the secretary Mr. R. A. F. Hammond, of the Ministry of Supply's Armament Research Establishment, Woolwich.

£2.5 m. Cement Works Scheme

A public inquiry has been held at Cheadle, North Staffordshire, by the Ministry of Town and Country Planning into the proposed siting by the British Portland Cement Manufacturers, Ltd., of a £2.5 million cement works at Cauldon. The project, which was approved by the Cheadle council, is expected to contribute an additional output of 7000 tons a week.

Atomic Power for Ships

A contract for drawings and costings of a prototype atomic power unit which could be applied to large merchant ships and warships has been placed by the Government with an engineering firm. Such work is considered necessary before any decision could be made on the possibilities of adapting atomic power for ship propulsion.

Chemical Company Moving

Consolidated Chemicals, Ltd., is to transfer its business from Bury St. Edmunds to Wrexham Trading Estate next month. Work will be found at Wrexham for about 50 people, mainly women, and about a dozen of the present clerical and technical staff will be transferred. Mr. C. D. Jenkins, managing director, states that the difficulty in obtaining staff induced the company to seek the better facilities at Wrexham.

Law and Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

J. C. ARNFIELD & SONS, LTD., Stockport, chemists. (M., 19/8/50.) July 17, deed dated July 12, 1950, securing £250,000 first deb. stock of James Woolley & Sons & Co., Ltd., together with a premium of up to 5 per cent payable in certain events; general charge. *Nil. Nov. 17, 1949.

BROWNS CHEMISTS (STOKE-ON-TRENT), LTD., (M., 19/8/50.) July 14, £4000 mort. to Tunstall Building Soc.; charged on 21 Market Street, Longton, Stoke-on-Trent. *£3,820. Jan. 3, 1947.

CLAY & SON, LTD., London, E., dealers in manures and horticultural sundries, etc. (M., 19/8/50.) July 12, letter of irrevocable authority securing to Midland Bank, Ltd., all moneys due or to become due to the Bank; charged on certain moneys. *£6000. Oct. 15, 1947.

JOHN E. MOORE, LTD., Yeadon, metallurgists, etc. (M., 19/8/50.) July 15, £4,500 charge, to J. E. Moore, Masham, and £7500 (not ex.) charge, to Westminster Bank, Ltd.; both charged on land at Cemetery Road, Yeadon, with buildings etc., known as Lakeside Works. *Nil. Dec. 28, 1948.

OAKES EDDON & CO., LTD., Liverpool, laboratory furnishers, etc. (M., 19/8/50.) July 12, mortgage to Midland Bank, Ltd., securing all moneys due or to become due to the bank; charged on 97 Prescot Street, West Derby, Liverpool, with machinery, fixtures, etc. *£260. Mar. 3, 1950.

L. M. WELSH, LTD., Hinckley, chemists, etc. (M., 19/8/50.) July 7, £1400 charge to Hinckley and Leicestershire Building Soc.; charged on 119 Priesthills Road, Hinckley. *Nil. Aug. 5, 1949.

EDWARD WIGGINS & CO., LTD., London, E., manufacturing chemists. (M., 19/8/50.) July 5, £6000 charge, to S. H. Bean, London; charged on The Hollies, Mill Hill Village, Hendon. *Nil. May 22, 1950.

JAMES WOOLLEY SONS & CO., LTD., Salford, chemists, etc. (M., 19/8/50.) July 17, Trust deed dated July 12, 1950, securing £250,000 deb. stock with a premium of up to 5 per cent charged on specified properties at Salford, Manchester and Oldham; and a general charge. *Nil. Oct. 26, 1949.

Satisfactions

CHINNOR INDUSTRIES, LTD., (formerly Chinnor Cement & Lime Co., Ltd.), London, E.C. (M.S., 19/8/50.) Satisfaction July 20 of deb. stock reg. Oct. 30, 1936, to the extent of £1731.

STEWARTS & LLOYDS, LTD., (M.S., 19/8/50). (Incorporated in Scotland). Satisfaction July 19, of deb. stock reg. Feb. 8, 1934, to the extent of £21,700.

Increases of Capital

The following increases in capital have been announced: British Resin Products, Ltd., from £1.5 million to £2.25 million; F. W. Berk & Co., from £300,000 to £340,000; John Poynter, Son & MacDonalds, Ltd., from £30,000 to £75,000.

Change of Name

The name of WILTON ROW EXTENSIONS, LTD., has been changed to MENROW PUMPS, LTD.

Company News

International Nickel Co. of Canada, Ltd.

Net earnings of the International Nickel Co. of Canada, Ltd., in terms of U.S. currency, in the first six months of this year were $20,385,591, equal to $1.33 per share on the common stock, compared with $20,983,417, or $1.37 per common share, in the corresponding period of 1949.

Manchester Oil Refinery, Ltd.

Declared interim dividend of 10 per cent (less tax) on its £325,000 ordinary stock for the year ended December 31, 1950.

New Registration

Arthur Bedwell & Co. (Hygiene Division), Ltd.

Private company. (485,158). Capital £1000. Distributing agents and sellers of sterilising and detergent substances, etc. Directors: A. Bedwell, J. H. Hinds, and A. J. Bedwell. Reg. office: 438/442 Barking Road, E.13.

The Stock and Chemical Markets

LED by British Funds and commodity shares, stock markets have maintained a better trend and supported business on a somewhat higher scale. It is considered that fresh taxation to pay for rearmament is likely to be left until the April Budget and the belief has helped market sentiment, although it is realised that such factors as the rising cost of materials, may, if continued, compel companies to raise more money to finance higher stocks.

Companies which can either directly or indirectly contribute to the arms drive appear to have excellent prospects of maintaining profits. Companies whose earnings depend largely on public spending power may have a difficult period ahead. It is hardly surprising that buying of industrial shares is very selective.

The chemical and kindred sections have shown movements in favour of holders. Imperial Chemical have rallied further to 42s. 3d. at the time of writing, the prevailing view being that there are reasonable prospects of the 10 per cent dividend being held. Armament and kindred work could offset any falling off in other sections of the group's activities. Monsanto changed hands around 49s., Fisons were better at 26s. 9d., while Albright & Wilson have risen sharply to 31s. 3d. Brotherton 10s. shares have kept at 20s., Laporte Chemicals 5s. units were 10s. 3d., Lawes Chemical also 10s. 3d., and Boake Roberts 28s. 9d., and W. J. Bush 81s. 3d. Elsewhere, Amber Chemical 2s. shares were 3s., F. W. Berk 2s. 6d. shares 10s. 3d., Bowman Chemical 4s. shares 5s. 3d. and Pest Control 5s. ordinary 6s. 9d. L. B. Holliday 4½ per cent preference were 19s. 6d., British Chemicals & Biologicals 4 per cent preference 17s. 3d. and Wolley 4¾ per cent debentures 104½.

The 4s. units of the Distillers Co. have kept steady at 18s. 7½d., United Molasses also improved to 42s. 9d. and United Glass Bottle at 75s. remained a very firm feature. Triplex Glass 10s. units, awaiting the financial results, have shown continued activity around 24s. Turner & Newall at 80s. 6d. were firmer, British Aluminium strengthened to 40s. 3d. and Borax Consolidated at 54s. 6d. have again held up well.

Fears that rearmament may check any expansion of house building next year kept a number of shares quiet, including Associated Cement at 83s. 6d. British Plaster Board 5s. units were 14s. 6d. Iron and steels again showed further activity with armament and kindred shares. United Steel were 28s. 4½d., Firth Brown 73s. 9d. and John Summers 31s. 9d. Elsewhere, Staveley were 78s. 3d. and Powell Duffryn 29s. 1½d.

Boots Drug further strengthened to 48s., Glaxo Laboratories were 46s. 3d., Sangers 21s. 6d., Beechams deferred 12s. 9d. and Griffiths Hughes 21s. British Glues & Chemicals 4s. shares have been firm at 24s. 6d. xd. There was a firmer trend among shares of companies connected with plastics, De La Rue being 24s. 3d., British Xylonite 75s., British Industrial Plastics 2s. shares 5s. 3d. and Kleemann 1s. shares 7s. 7½d. Oils were slightly more active, although best levels were not held. Anglo-Iranian came back to £5¾, Shell were 62s. 6d., and Trinidad Leaseholds 24s.

Market Reports

TRADING conditions on the industrial chemicals market continue more or less as reported last week; actual movements have been restricted by seasonal influences. Interest in forward business is again widespread and the undertone throughout the market is firm. The better conditions which have recently returned to the coal tar products market have been fully maintained and bookings for forward delivery have represented good volumes. Prices throughout are steady.

MANCHESTER.—Trading conditions during the past few days have been more active. There has been a good aggregate demand for the soda compounds against existing commitments, also a steady call for potash chemicals and ammonia and magnesia products. There has been a welcome increase in new business, on both home and export account. A fair trade has been in evidence in light and heavy tar products. A general firmness of the market has been fully maintained.

GLASGOW.—There has been a slight falling off in orders during the past week owing to the fact that many English suppliers were closed down for annual holidays, and customers, aware of this, were not calling forward supplies. The export market is becoming more difficult each day as the international situation depreciates.

Patent Processes in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patents Office, Southampton Buildings, London, W.C.2, at 2s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Amides and their sulphonated derivatives.—Nopco Chemical Co. Feb. 13 1948. 642,836.

Manufacture of titanium pigments.—National Titanium Pigments, Ltd., J. T. Richmond, G. G. Durrant, and R. J. Wigginton. Dec. 15 1946. 642,979.

Process for printing or dyeing superpolyamide fibres.—Ciba, Ltd. Feb. 20 1948. 642,837.

Process and apparatus for the manufacture of fertilisers.—J. Balfour & Co., Ltd., J. H. Balfour, W. R. Normand, and A. M. Cameron. March 3 1949. 642,795.

Polmerisation of 4-vinylcyclohexene dioxide.—Canadian Industries, Ltd. March 24 1948. 642,799.

Polymeric 4-vinylcyclohexene dioxide.—Canadian Industries, Ltd. March 24 1948. 642,800.

Polymerisation of 4-vinylcyclohexene dioxide.—Canadian Industries, Ltd. April 14 1948. 642,983.

Acyl polyalkylene-polyamine biguanides.—General Aniline & Film Corporation. April 29 1948. 642,989.

Diazotype photoprinting materials stabilised with sulpho amino benzoic acids.—General Aniline & Film Corporation. May 7 1948. 642,992.

Electrolytic processes in particular processes for the electrolytic production of fluorine.—Imperial Chemical Industries, Ltd., W. N. Howell, and H. Hill. May 13 1949. 642,812.

Alkyl-substituted halogenosilanes.—British Thomson-Houston Co., Ltd. May 19 1948. 642,997.

Electrically-insulating coating compositions.—Indestructible Paint Co., Ltd., C. R. Pye, and H. F. Bremer. May 13 1949. 642,816.

Electrically-insulating coating compositions.—Indestructible Paint Co., Ltd., C. R. Pye, and H. F. Bremer. May 13 1949. 642,817.

Preparation of biguanide derivatives.—Soc. Des Usines Chimiques Rhone-Poulene. May 28 1948. 643,000.

Fusion-deposition welding.—Linde Air Products Co. July 8 1948. 642,854.

Preparation of foraminate catalysts.—Imperial Chemical Industries, Ltd., P. W. Reynolds, and R. L. Robinson. Aug. 10 1949. 642,861.

Methods for soldering aluminium or aluminium alloys and soldering materials therefor.—Pirelli-General Cable Works, Ltd. Sept. 14 1948. 642,869.

Phosphors.—Marconi's Wireless Telegraph Co., Ltd. Nov. 14 1944. 642,701.

Method and apparatus for making a fabricated sheet of unspun fibres.—Fibre Products Laboratories, Inc. July 15 1946. 642,890.

Moisture-resistant coating and method of producing it.—Western Electric Co., Inc. Aug. 1 1946. 642,892.

Process for the production of sterols from oils, fats and fatty acids.—Severoceske Tukove Zavody (Drive Juri Schicht) Narodni Podnik. Nov. 20 1946. 642,714.

Process for the manufacture of fatty acids of high melting point from waste fatty substances.—Severoceske Tukove Zavody (Drive Jiri Schicht) Narodni Podnik. Nov. 20 1946. 642,715.

Method for the extraction of nucleic acid.—M. A. E. Assada. Nov. 26 1946. 642,716.

Production of alumina.—Aluminium Laboratories, Ltd. Jan. 2 1947. 642,943.

Method of pyrogenetically treating a mixture of combustible and non-combustible material and a furnace therefor. J. E. Greenawalt. Jan. 8 1947. 642,898.

Process for the esterification of fatty acids with low-molecular univalent alcohols.—Severoceske Tukove Zavody (Drive Jiri Schicht) Narodni Podnik. Jan. 16 1947. 642,718.

Glassy phosphate powder compositions and process of making the same.—Albright & Wilson, Ltd. Feb. 28 1947. 642,944.

Glassy phosphate powder compositions and process for making the same.—Albright & Wilson, Ltd. Feb. 28 1947. 642,945.

Gas analysers.—C. A. Parsons & Co., Ltd., and A. E. Martin. Jan. 28 1948. 642.725.

Manufacture of isopropyl alcohol.—Distillers Co., Ltd., J. Howlett, and W. L. Wood. April 1 1948. 642,905.

Process for the conversion to sulphur and/or sulphur dioxide of other sulphur compounds and catalysts therefor.—K. Williams. April 9 1947. 642,726.

Manufacture of moulded articles from materials containing cold-swelling starch.—N.V. W. A. Scholten's Chemische Fabrieken. April 14 1947. 642.906.

Method of removing chlorate substances from alkali metal hydroxides.—Diamond Alkali Co. April 15 1947. 642,946.

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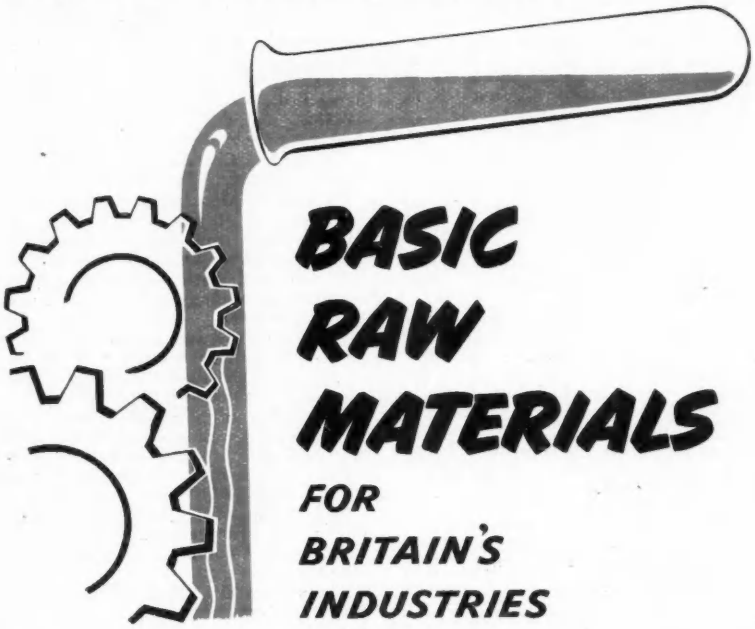

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Sulphonated 1, 3-di (nitrophenyl) triazenes.—General Aniline & Film Corporation. April 16 1947. 642,947.

Process and apparatus for the cooling of molten lubricating greases.—N.V. De Bataafsche Petroleum Maatschappij. May 2 1947. 642,948.

Manufacture of coloured photographic layers.—Gevaert Photo-Producten N.V. May 13 1947. 642,728.

Process for preparing benzodioxane derivatives and the product resulting therefrom.—A. H. Stevens. (Monsanto Chemical Co.). May 20 1947. 642,949.

Packages for use in liquid purification.—American Cyanamid Co. May 23 1947. 642,732.

Process for the preparation of alkanolamines.—Soc. Carbochimique Soc. Anon. June 25 1947. 642,950.

Processes of producing condensation products of phenols and process of preserving rubber.—Monsanto Chemical Co. July 10 1947. 642,827.

Process for the removal of silica from an aqueous fluid.—American Cyanamid Co. July 30 1947. 642,951.

Soapless detergents mixed with triphosphates as builders.—Procter & Gamble Co. Aug. 1 1947. 642,921.

Luminescent materials.—Sylvania Electric Products, Inc. Aug. 5 1947. 642,742.

Convertible alkyd resins.—N.V. De Bataafsche Petroleum Maatschappij. Nov. 26 1947. 642,828.

Porous pots for primary electric cells.—India Rubber, Gutta Percha & Telegraph Works Co., Ltd., Hawley Products, Ltd., W. W. Puffet, and A. Lewin. Aug. 30 1948. 642,744.

Filter for purifying a liquid or gaseous fluid.—J. Depallens. Sept. 9 1947. 642,748.

Process for preparing reaction products of natural rubber or synthetic rubber-like materials with sulphur dioxide.—Rubber-Stichting. Oct. 3 1947. 642,959.

Lubricating composition.—N.V. De Bataafsche Petroleum Maatschappij. Oct. 6 1947. 642,960.

Infra-red gas analysing apparatus.—C. A. Parsons & Co., Ltd., and A. E. Martin. Oct. 6 1948. 642,750.

Continuous bleaching of glyceride oils.—Procter & Gamble Co. Oct. 16 1947. 642,751.

Method of producing pinacols.—White Laboratories, Inc. Oct. 24 1947. 642,752.

Process for the manufacture of olefin oxides.—R. S. Aries. Oct. 28 1947. 642,961.

Repeatedly ignitable composition rods.—F. K. Knutsson-Hall. Nov. 7 1947. 642,754.

Preparation of acetals.—General Aniline & Film Corporation. Dec. 8 1947. 642,830.

Process of brazing austenitic ferrous metals and articles produced thereby.—Ford Motor Co., Ltd. Dec. 18 1947. 642,768.

Stabilisation of tetrahydrofuran.—E. I. Du Pont de Nemours & Co. Dec. 19 1947. 642,969.

Refining of oils and motor fuels.—Refiners, Ltd., and T. Scott. Nov. 29 1948. 642,772.

Process for the production of a catalyst.—Spolek Pro Chemickou a Hutni Vyrobu, Narodni Podnik. Dec. 23 1947. 642,970.

Process for preparing metals powders for the purposes of powder metallurgy from copper and iron containing ores.—D. Primavesi. Dec. 29 1947. 642,773.

Nitriles and method of preparing same.—Resinous Products & Chemical Co. Jan. 1 1948. 642,930.

Apparatus for and method of applying protective coating material to the inside of a pipe or the like.—Dearborn Chemical Co. Jan. 8 1948. 642,777.

Production of potentially heat reactive thermosetting resins and infusible resins and resinous products obtainable therefrom.—Harvel Research Corporation. Jan. 20 1948. 642,780.

Retardation of development of reversion flavour in hydrogenated fats and oils.—Procter & Gamble Co. Feb. 7 1948. 642,977.

Germanium dry rectifiers and detectors.—Sperry Gyroscope Co., Inc. June 4 1945. 643,200.

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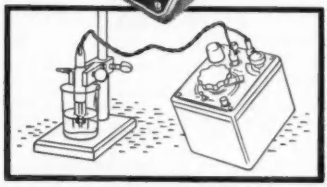

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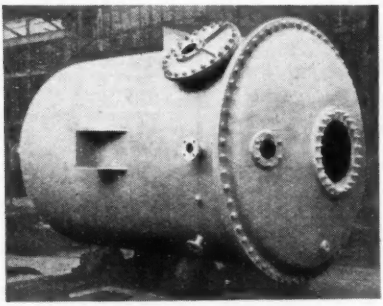

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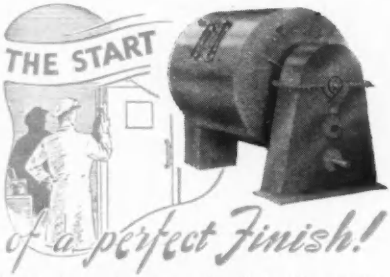

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